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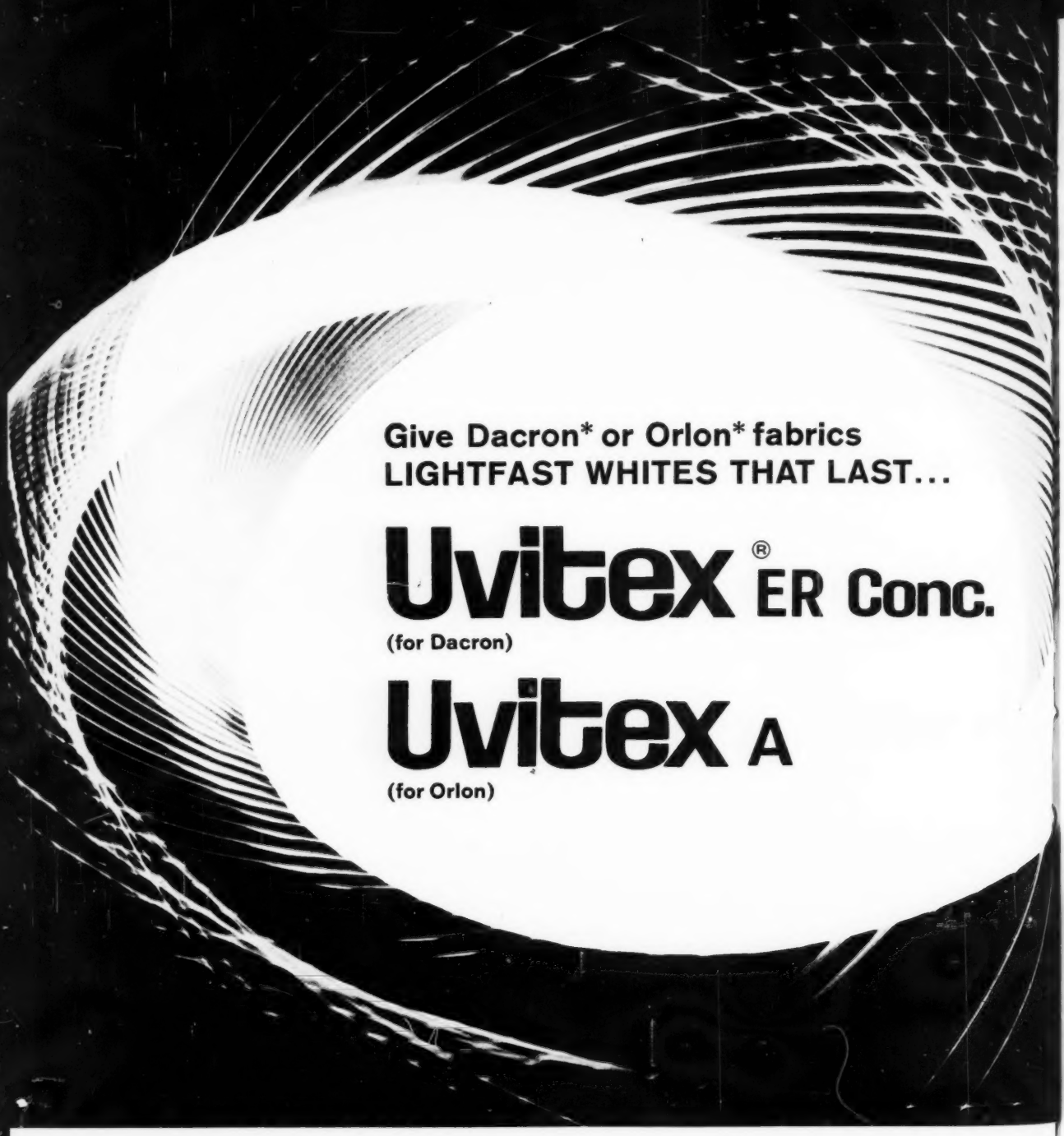

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IMPREGNATION FOR WATER REPELLENCY AND ITS LOGICAL USE WITH SYNTHETIC-RESIN FINISHING*

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This article discusses the principles underlying water-repellent impregnation and synthetic-resin finishing as well as their combined effect on the properties of the treated fabric.

INTRODUCTION

About ten years ago final finishing with thermosetting resins still had essentially the same connotation as crease-resistant finishing. Nowadays, however, this type of textile treatment takes many different forms. Thus, water-repellent impregnation is today commonly a part of final finishing.

The following survey reviews the present state of water-repellent impregnation with a consideration of simultaneous resin finishing.

OBJECTS AND METHODS IN COMBINATION FINISHING

With few exceptions, water-repellent finishes utilize the high interfacial tension between long-chain aliphatic compounds and water. As is known, a water-repellent effect is produced by the presence, on a surface, of molecules having pronounced hydrophobic groups arranged as evenly as possible and facing in the same direction (Figure 1).

Water applied to such a surface cannot spread because of its very low adhesiveness, which is reduced to practically zero; instead it forms a sphere, because only the internal cohesiveness of the water is effective (Figures 2a and 2b).

Water has a tendency to wet interfaces and will therefore curve upwards, in spite of gravity, when in contact with the sidewalls of a vessel free from fat (Figure 3).

These conditions explain the capillary forces that influence adhesion and that are responsible for the striking absorptivity of nonimpregnated textiles, especially of filament or spun rayon. Each thread that is spun from individual fibers acts as a bundle of

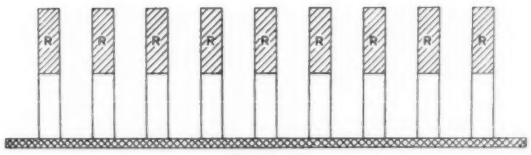

Figure 1
R = ideally arranged fatty acid radicals with hydrophobic properties. Strong scouring of the fabric disarranges the molecules and thereby reduces their repellent effect.

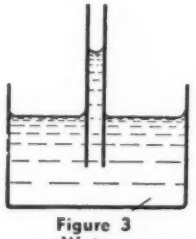

Figure 3
Water.

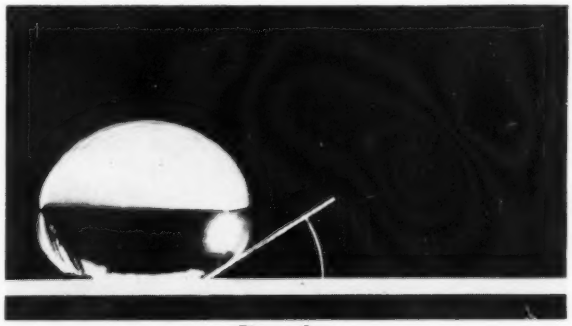

Figure 2a
High interfacial tension and consequently small contact angle.

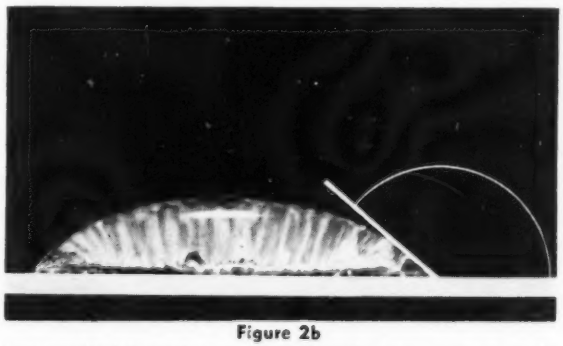

Figure 2b
Low interfacial tension and consequently large contact angle.

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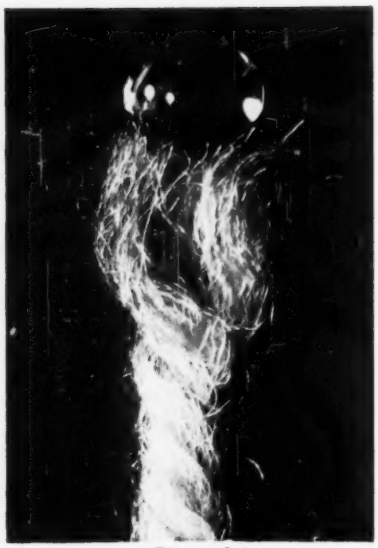


Figure 4
Impregnated fiber.

Figure 5
Simplified representation of the Pfersee Spraying Apparatus, according to Dr Bundesmann.

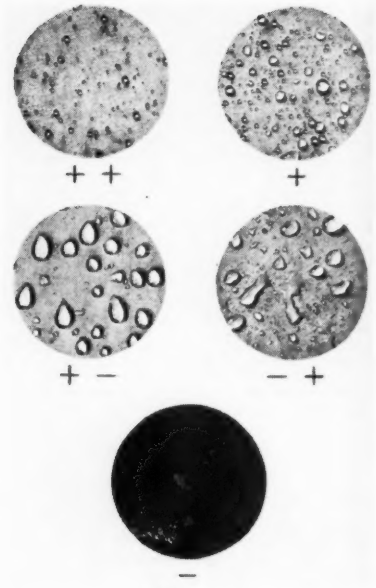


Figure 6
Test illustrations for the evaluation of the pearling-off effect.

fine capillaries, and the fibers themselves, particularly regenerated cellulosic fibers, which have a large inner surface, also act as a decidedly water-absorbing system.

By means of impregnation, the capillary forces of a fiber may be practically eliminated (Figure 4).

Capillary forces affect even synthetic fibers, which normally absorb very little water, as well as wool. Therefore, these fibers also require water-repellent impregnation, depending on the end use of the textiles into which they are made. Generally, the end use of the goods determines the objective of the treatment. This objective may be either maximum waterproofness (closing of the pores of the fabric) or maximum water repellency.

The ideal combination of these two possibilities, namely, optimal impermeability together with optimal water repellency, is impossible to achieve. Besides, it is often unnecessary, since different fabrics need basically different properties. By way of contrast, compare poplin for raincoats and tarpaulins.

The choice of impregnating techniques and of test methods will depend on the type of textile material to be treated and on its intended end use.

WATER IMPERMEABILITY——— The testing of heavy fabrics is usually carried out by hydrostatic methods, depending on the severity of service for which they are intended. Typical examples of test methods are the trough test and the durability test, the latter carried out by means of metal cylinders. Another method, which is more reliable, consists in uniformly increasing the pressure of a water column in order to determine the point at which a few drops of water will first penetrate the fabric. Equipment employed for this purpose includes Schopper's water-pressure gauge and Schmerber's apparatus. When both waterproofing and water repellency are involved, these techniques have very little value. In that case, the test methods used in conjunction with water-repellent, air-permeable impregnation are usually preferred.

WATER REPELLENCY——— The degree of water repellency is mostly determined by kinds of equipment that imitate rain as well as the abrasion that occurs when a garment is worn. This determination is of particular interest in the case of fabrics for raincoats and similar articles. The best-known test of this kind in Germany, which is also used for purposes of standardization, is the Bundesmann test. An improved apparatus for this test has been available since 1950 under the designation "Pfersee Spraying Apparatus, according to Dr Bundesmann" (manufacturer: Fa Erhardt & Leimer oHG, Augsburg 8) (Figure 5).

The advantage of this test method lies in its accuracy and in easily reproducible results; furthermore, several fabrics may be tested at the same time. The degree of water absorption is determined by weighing of the sprayed sections before and after the test and is preferably designated as the "spray value."* The pearling-off effect, which is visually evident, is most important as a sales attribute; test illustrations have proved very effective in evaluating pearling off (Figure 6).

If extremely exact measurements are not required, satisfactory results may be obtained with a simplified apparatus, the so-called Spray Tester, which originated in the United States. However, the simplified tester does not differentiate between various degrees of good repellency.

Space does not permit mention here of all the possible test methods and types of equipment.

In addition to the concepts discussed in connection with water repellency, there is also widespread interest in the absorptivity of textile materials. A good illustration of this property, which is closely related to the capillary character of the fiber, is the wick-like behavior of nonimpregnated sewing threads. This may be very disadvantageous in the case of rainwear sewn with such water-absorbent thread, as is shown in Figures 7a and 7b.

In connection with the above discussion of the nomenclature of technological testing, it seems appropriate to refer also to a frequently misunderstood concept, namely, that of

*As used in the original German text, the term "spray value" means absorption; to the American reader, however, it means relative freedom from absorption. In order to avoid confusion, the translator will henceforth substitute "spray-absorption value" for the German "spray value."

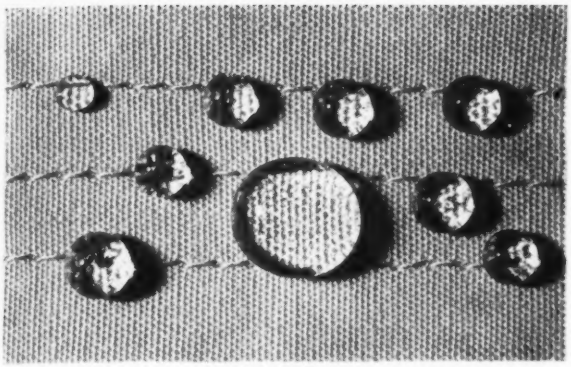


Figure 7a

Impregnated sewing thread prevents water absorption.

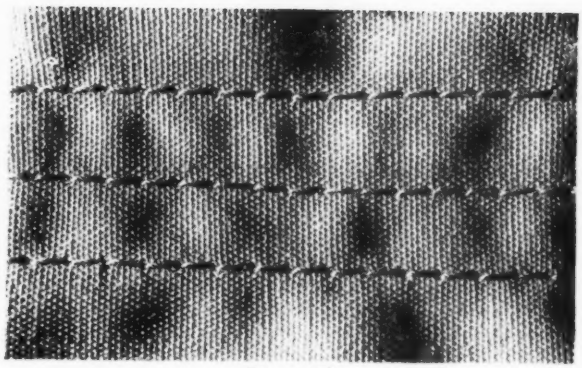


Figure 7b

Nonimpregnated sewing thread absorbs water and causes distortion of the fabric.

"swelling value."

All the methods discussed so far for determining the hydrophobic properties of fabrics are based on resistivity to pure water; a determination of the swelling value, on the other hand, depends on enforcing complete penetration of the textile material by a solution of a wetting agent. This is followed by centrifuging under standardized conditions in the apparatus shown in Figure 8. The swelling value is the percent of water retained on weight of dry fiber.

As has already been suggested by others, the term "water retentivity" would be more appropiate than "swelling value"; however, the latter designation is already firmly established.

Figure 9, which shows the spray-absorption values and swelling values for different fabrics, demonstrates very clearly that there is no relationship between these properties. A very interesting example is that of a fabric made from Cassella's Pan acrylic fiber, which, in spite of its very low swelling value and as a result of capillary action, absorbs as much water during spraying as does, eg, a spun-rayon gabardine. In the case of Perlon polyamide fabric the contrast is not so striking; however, the need for water-repellent impregnation is equally convincing. Obviously, the forces causing capillary action in a fabric depend to a large extent on the way in which it has been constructed in spinning and weaving.

In the case of a few impregnating agents that are based on organic compounds, high drying temperatures yield a small decrease in swelling value. Except for these instances, a purely water-repellent treatment does not change the swelling value. On the contrary, the swelling value is almost exclusively a function of the synthetic resins used in such finishing, or rather of the aldehydes they

Figure 8

Laboratory centrifuge with ampoules for the determination of swelling values.

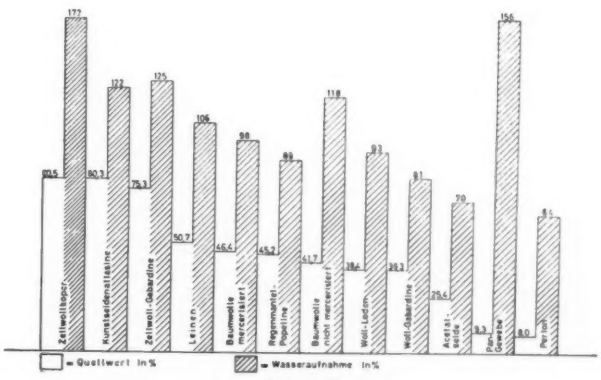


Figure 9

Water absorption of various fabrics, expressed in spray-absorption values and swelling values, respectively.

Cross-hatched areas represent water absorption in %
Noncross-hatched areas represent swelling value in %

Reading left to right: spun-rayon twill, rayon sateen, spun-rayon gabardine, linen, mercerized cotton, poplin for raincoats, unmercerized cotton, loden (brushed coarse worsted fabric), wool gabardine, acetate, Pan acrylic fabric, Perlon polyamide fabric.

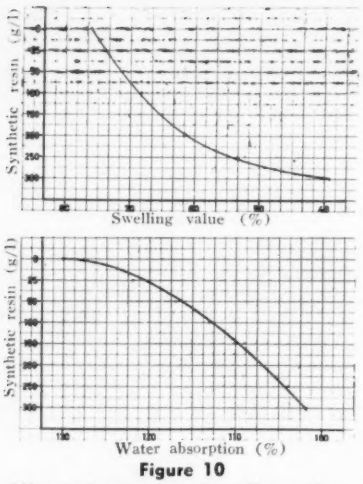


Figure 10

Water absorption and swelling values from the Bundesmann spray test.

contain, particularly formaldehyde. With respect to the resulting quality of the goods, the decrease in swelling value produces several advantages, but also a few disadvantages, in the properties of the fiber or fabric. A reduced tendency to crease is a positive result; another thoroughly desirable factor is the great resistance of the fiber or fabric to a change in dimensions upon exposure to water. Among a series of finishing processes based on this principle, a chemical treatment for shrink resistance deserves special mention. Furthermore reduced swelling of the fiber is bound to reduce absorptivity and, to a lesser extent, water absorption, or spray-absorption value (Figure 10).

A practical example of simultaneous reduction in swelling value and production of water repellency is the dirt-resistant behavior of staple rayon finished with both synthetic resins and impregnating agents. For instance, splashed-on, watery street soil cannot penetrate into the fabric. Instead, after drying, it remains loosely attached to the surface of the fabric and can easily be brushed off (see Figures 11a and 11b).

Unfortunately, the concept of dirt resistance is frequently interpreted in misleading fashion. Objectively, it should signify only resistance to watery soil or colored solutions. The type of finishing defined above does not, however, provide adequate protection against fatty substances, such as grease, or against contamination by pigments, such as carbon black.

"Dripfast" finishing (fastness to water spotting) may also be produced by the combined effect of water repellency and reduced swelling value. The term "dripfast," sometimes also called "waterfast," does not exactly constitute a happy choice; since it has already been coined, however, it shall be retained. Ordinarily it signifies the insensitivity of rayon fabrics, mostly glossy ones, to the impact of drops of water; where it thus comes in contact with unfinished material, water produces changes in glossiness and in dye shade. The principal cause of this defect is a change in the surface of the fabric structure, due to local swelling, and a subsequent change in light emission from the areas concerned.

A further disadvantage is that subsequent ironing removes these discolorations only with difficulty or sometimes not at all. Therefore, preventive combination finishing is also extremely important in this case.

As an example, Figure 12a shows a section of the lining of a raincoat; surprisingly, the lining had not been impregnated. Part of the water flowing off the outside of the coat was absorbed at the bottom by the lining and, on drying, left the well-known edge effect. An R-O-X print of the fabric proves that this is a manifestation of genuine swelling (see Figure 12b).

Furthermore, final finishing is responsible for a number of additional advantageous properties; until recently, however, these properties had either been neglected or forgotten. Thus, "drip-dry" cotton fabrics (need no ironing), which are now popular, are mainly produced by final finishing. Although suitable pretreating and aftertreating methods are important to the final quality of the goods, these factors have merely a supporting effect.

As is to be expected, the phrases used in connection with drip-dry finishing largely apply to the usual type of synthetic-resin finishing, too. Thus, fabrics are described as easier washing, faster drying, much easier to iron, etc.

In addition to the properties listed above, resin-finished fabrics possess reduced sensitivity to alkalis and acids, as well as increased resistance to micro-organisms; these justify the designations of "perspiration-resistant" and "no staining by molds," respectively.

Where drip-dry finishing is applied to blouses and to garments, in general, simultaneous water-repellent finishing is desirable. The impregnating agents used for this purpose should be as washfast as possible.

In finishing washable fabrics, it makes very little difference in drying time whether synthetic resins are used alone or in combination with built-in impregnating agents. Even the best type of water-repellent impregnation cannot prevent thorough wetting out when a hot, strongly surface-active detergent solution is employed. The water absorption of a fabric is determined only by the swelling value, which, in turn, depends on the type of synthetic resin in the finish.

In addition to the benefits of combination finishing, there are a few shortcomings, due to the presence of synthetic resin. As already mentioned, these disadvantages include the increased sensitivity to abrasion of filament or spun-rayon fibers and the reduced tensile strength of cotton. In no case, however, do the losses in strength exceed those that would be produced by corresponding treatments based only on synthetic resins.

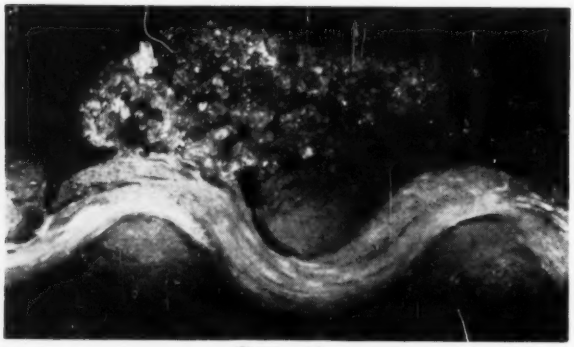


Figure 11a

Watery street soil drying on the surface of a fabric that has a water-repellent finish.

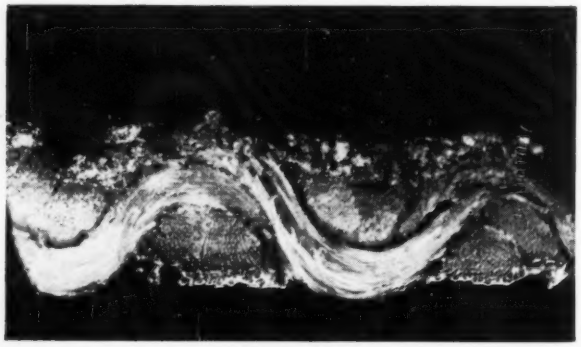


Figure 11b

Dirt penetrating deeply into the same staple-rayon fabric in the untreated state.

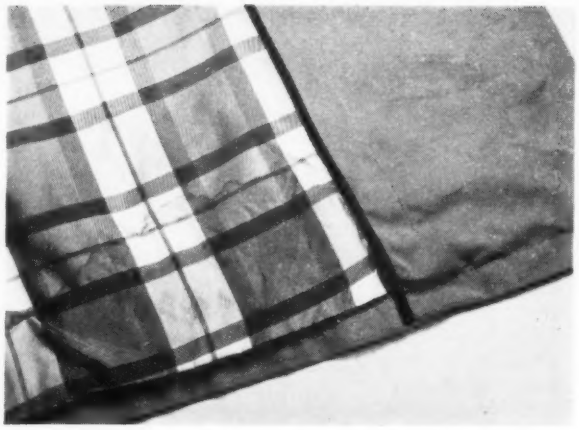


Figure 12a
Wetted areas on the nonimpregnated rayon lining of a raincoat.

Figure 12b
R-O-X print of the edge of a spot. Local swelling of the fibers causes a change in the reflection of light.

The abrasion resistance and the swelling value of finished regenerated fibers are relatively closely related, in the sense that low swelling values for a given resin are usually accompanied by reduced abrasion resistance. This direct relationship is more evident than, eg, the ratio of the abrasion resistance to the amount of synthetic resin used, inasmuch as even relatively large amounts of a resin that contains a small amount of aldehyde (especially when used with a mild catalyst) will produce a considerable deposit of resin but only a lesser reduction in swelling value; partially as a result of this, lower crease angles but better abrasion resistance are obtained.

Attempts to diminish the loss in abrasion resistance by the addition of some kinds of products, such as softeners, dispersions of synthetic substances, paraffin emulsions, etc, have been only partially successful. As far as test results are concerned, the use of such additives frequently results in surprisingly better abrasion resistance. However, the question remains if this improvement would be equally as great in practical wear.

Unfortunately, no known mechanical test for determining the wearability of fabrics is completely reliable. Therefore, necessity dictates for the time being that abrasion resistance be taken as a point of comparison for evaluating wearability.

Furthermore, there is not much point to producing improved abrasion resistance by the addition of substances that buffer acids. Although this technique yields a higher resistance to abrasion, insufficient setting of the resin causes a lowering of the crease angle. These explanations shall not be taken to mean that the finisher has no means of increasing abrasion resistance. Choice of a suitable precondensate but, above all, the proper conditions for finishing are responsible for obtaining both good wearability and high crease angle.

Thus, experiments with spun-rayon dress goods have shown that crease angles resulted that were larger by 5 to 15° when the fabric was dried with low tension across the width than when it was finished, with the same liquor, with higher tension across the goods. In this respect, however, even the best intentions of the commission finisher are often frustrated by the fixed requirements for width or length in the finished goods. The question as to which of the following two methods is better cannot be decided unequivocally. One process consists in drying a fabric without stretching, eg, on a short-loop drier, and in carefully flattening it afterwards, perhaps by steaming; the other method allows the fabric to pass once through a frame under tension in width but not length. Ordinarily, the first process offers certain advantages, because it produces two-dimensional shrinkage control.

Since normal drying temperatures suffice to set modern synthetic-resin precondensates, a residual moisture content of 4 to 6%, eg, in rayon goods, is permissible. Condensation should therefore be reserved only for special processes, for instance, for obtaining permanent changes in the surface of a fabric, such as permanent embossing, pleating, or chintz finishes.

Especially as to the meaning of condensation, however, experts hold widely divergent opinions. According to ordinary usage, finishing by means of condensation refers to a baking process at temperatures of more than 120°C (248°F). However, a number of synthetic resins do not require any heat for setting; instead they condense as a result of an exothermic reaction, ie, one that takes place independently. In this case, the heat produced by the drying of the fabric serves merely to accelerate the reaction. In order to be accurate, therefore, one must distinguish, with regard to the common concept of condensation, between

a) a thermal, ie, classical condensation, and
b) a newer, chemical type of condensation.

This new idea was first applied about nine years ago, with the creation of the new Knittex type of products (Chem Fabrik Pfersee).

After this detour into the field of technology and into practical applications of combination finishing, we return to water-repellent impregnation itself and to the principal products used in conjunction with it.

VARIOUS WATER-REPELLENT FINISHES

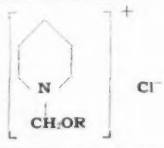
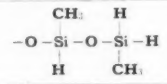
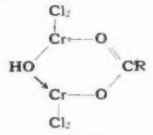
Table I presents six different types of water-repellent finishes, each of which will be briefly discussed.

TYPE No 1———The basic principle underlying the classical method of two-bath impregnation by means of soap and suitable metal salts is listed in this table merely for the sake of completeness.

With respect to the end quality of the goods—rather than by virtue of their nature—the Fuell-Impraegnole (Impraegnol fillers) (Chem Fabrik Pfersee) may be classed with this group. These products permit duplication, in only one bath, of the finishing effect obtained in the past by heavily impregnating the goods in a time-consuming two- or three-bath process. As a rule, this involves a skillful combination of water-repellent emulsions with dispersions of synthetic materials, which contain, in

TABLE I

Structure of the most widely used water-repellent finishes (simplified representation)

1	Two-bath impregnation	$3\ RCOONa + (CH_3COO)_3Al \longrightarrow Al(OOCR)_3 + 3\ CH_3COONa$
2	Emulsions containing aluminum salts a) with protective colloid b) without protective colloid Emulsions containing zirconium salts	$Al\begin{cases}OOCR\\OOCR\\OH\end{cases}$ + emulsified paraffin + basic aluminum salt
3	Condensation products of aminoplasts and fatty acids	$C=O$ ($NHOCR$, NH_2) + formaldehyde
4	Condensation products of fatty ethers and pyridine	
5	Silicones	
6	Organic chromium compounds	

addition, softeners and agents that give a smooth finish.

TYPE No 2———Because of universal utility and favorable price, the family of water-repellent impregnating agents represented by Type No 2 holds today the largest share of the market. Historicaly, the application of concentrated emulsions containing aluminum salts represents the beginning of modern techniques for water-repellent finishing. This use is protected by German Patent 702,628, which was applied for in 1930 by the Chemischen Fabrik Pfersee. For reasons of simplification, the only representative of Type No 2 listed in Table I is an aluminum-based finish that does not contain emulsifier or protective colloid.

TYPE No 2a———Among emulsions containing protective colloids, even those that originated at the beginning of this development still find wide application today. They are usually employed on goods for which finishing is to provide a better hand, in addition to water repellency. As the protective colloid, these emulsions generally contain degraded glue, gelatine, polyvinyl alcohol, etc. Since this colloid constituent greatly improves their stability, these emulsions offer many possibilities for use in combination with various finishing agents.

In connection with synthetic-resin finishing, however, this type of water-repellent impregnating emulsion has not achieved much significance. This may be due either to the relative acidity required in such an emulsion or to the tendency of its colloids to develop foam. Furthermore, the protective colloid, which is usually a decomposed albuminous substance, may cause the development of unpleasant odors in the presence of formaldehyde.

TYPE No 2b———The possibilities of development in the field of metal salt-paraffin products appear to have reached their culmination with zirconium emulsions that are free from protective colloid and from emulsifiers, and that need only to be diluted before use. Incidentally, the preparation of such emulsions is also covered by various patents belonging to the Chemischen Fabrik Pfersee.

A preferred field of application for the aluminum products free from colloid has been found in connection with crease-resistant finishing. The addition of these products in amounts of 30 to 80 grams per liter of precondensate liquor makes possible a strong reduction in the water sensitivity of staple-rayon and filament-rayon fabrics. A simple rule of thumb is that successful water-repellent impregnation by means of a synthetic-resin product and an impregnating emulsion decreases the spray-absorption value of the treated goods to about one-fourth of the original value. The impregnating effect thus obtained corresponds approximately to the sum of the effects achieved individually by the synthetic resin and by the impregnating agent.

However, if a special zirconium emulsion together with a special resin-setting catalyst is used instead of the aluminum products, the resulting hydrophobic effect exceeds the sum of their individual effects. The use of such an emulsion, together with the usual amounts of synthetic resin, makes it possible to improve still more markedly the water resistance of spun-rayon and filament-rayon fibers. On the basis of spray tests indicating that fabrics finished in this manner attain spray-absorption values of 5 to 15%, this method of treatment was called Knittex water-repellent finishing. In addition to the use of this process on spun-rayon outer garments, new possibilities of application appeared in the case of distinctly fashion goods (velvet, corduroy, etc). These applications are made possible by variation in the synthetic-resin ingredient and by the addition of different agents for adjusting the handle of the goods. The use of such finishes on cotton fabrics, particularly poplin for raincoats, represents further progress.

For the sake of completeness, it is pointed out that this type of special finishing is subject to the laws of ordinary synthetic-resin finishing. With regard to crease angle and abrasion resistance, a fabric thus treated for water repellency behaves just as does the usual highly finished fabric, prepared by incorporation into the finish of an ordinary water-repellent impregnating emulsion; however, it has much better water resistance.

TYPE No 3———Water-repellent impregnants of this type are distinguished by good effectiveness and remarkable washfastness. In order to serve their purpose, however, they require postcondensation, a step not needed in the case of the products based on aluminum or zirconium. In combination with synthetic resins very good results are being obtained. Since these products are still high-priced, however, their use has hitherto remained relatively restricted.

TYPE No 4———Another group of compounds infrequently used in Germany comprises water-repellent impregnating agents based on reaction products of pyridinium compounds and relatively long-chained aliphatic hydrocarbon radicals. High cost, the fact that they are relatively difficult to work up, and, in addition, initial spray-absorption values that do not always meet our demands may be responsible for their lesser use. Examples of such products include Cerol

(Concluded on page 977)

Proceedings of the
American Association of Textile Chemists and Colorists

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December 16, 1957

36th CONVENTION ATTRACTS 1730 REGISTRANTS

Seventeen hundred and thirty members and guests, a record registration for an AATCC convention held in New England, turned out last month for the Association's 36th National Convention.

The three-day meeting, held Nov 14-16 at Boston's Hotel Statler, was the first to be held under the joint auspices of the Northern New England, Rhode Island, and Western New England Sections, which comprise the New England Region.

Highlights of the Convention included: a technical program, which featured five sessions offering a total twenty-five papers; the 1957 Intersectional Contest, offering five Sectional papers; the annual Olney Medal Award Luncheon; the 1957 AATCC Textile Dyeing & Finishing Exhibition, featuring approximately fifty individual exhibits; the Annual Banquet, honoring Honorary and Charter Members; a joint concert by the Band and Glee Club of Harvard University; a diversified program for lady guests; and a program of special tours to nearby schools and research centers.

In conjunction with the Convention, the Council met at Lowell Technological Institute, Lowell, Mass, on Thursday, November 14th, for its 208th meeting. (A report of this meeting appears elsewhere in this issue).

Convention Chairman Ernest R Kaswell, vice president (New England Region), was assisted by an Executive Committee consisting of AATCC President George O Linberg, chairman ex-officio; the chairmen of the three New England Sections, ie, Edward B Bell of Northern New England, Remus F Caroselli of Rhode Island, and Thomas J Gillick, Jr of Western New England, as assistant convention chairmen; George P Paine, AATCC executive secretary; and Richard R Frey, AATCC assistant secretary.

Chairmen of the various subcommittees were as follows: Dining, Henry X De Redon; Entertainment, R June Ericson; Exhibits, Donald H Thomas; Finance, Azel W Mack; Hotel, Harrison M Gorton, Jr; Ladies, Edward S Chapin and Mrs George O Linberg; Printing, Thorwald Larson; Publicity, Raymond J Carey; Reception, Raymond B Taylorson; Registration, Robert J Peirent; and Technical Program, J Edward Lynn.

EXECUTIVE COMMITTEE & COMMITTEE CHAIRMEN — 36TH NATIONAL CONVENTION

Seated (l to r): **Edward S Chapin, chairman, Ladies; Thorwald Larson, chairman, Printing; Philip S Durfee, Reception; Ernest R Kaswell, chairman, Executive Committee; R June Ericson, chairman, Entertainment; George O Linberg, AATCC president & chairman ex-officio, Executive Committee; Mrs George O Linberg, cochairman, Ladies; Thomas J Gillick, Jr, chairman, Western New England Section; Edward B Bell, chairman, Northern New England Section**

Standing (l to r): **Richard R Frey, assistant secretary, AATCC; George P Paine, executive secretary, AATCC; Remus F Caroselli, chairman, Rhode Island Section; Henry X deRedon, chairman, Dining; Frederick V Traut, chairman, National Conventions Committee; Raymond B Taylorson, chairman, Reception; Harrison M Gorton, Jr, chairman, Hotel Reservations; Robert J Peirent, chairman, Registration; Raymond J Carey, chairman, Publicity; Donald H Thomas, chairman, Exhibits; Azel W Mack, chairman, Finance.**

Scenes at the registration desk. Total registration—1730—was the largest for any AATCC convention held in New England.

AATCC President George O Linberg (right) and Convention Chairman Ernest R Kaswell (left) welcome Seiichi Kurokawa, director and chief of engineering of Fukui Seiren Kako, Ltd, Fukui, Japan, who probably made the longest trek to attend the 36th National Convention.

TECHNICAL SESSIONS ——All technical meetings were held in the Ballroom with the exception of the Saturday afternoon session, which was held in the Bay State Room. No two sessions were held at the same time, affording the 1957 convention-goer an opportunity to hear the papers of his choice with no conflicts.

A Textile Waste Symposium, under the chairmanship of Duane W Snyder, Crompton-Shenandoah Co, was the initial attraction on the program on Thursday morning. It featured the following papers: "Pollution Control of New England Interstate Waters"—Joseph C Knox, New England Interstate Water Pollution Control Commission; "Disposal of Combined Textile Finishing Wastes and Domestic Sewage"—George G Bogren, Weston & Sampson; and "Treatment of Mixtures of Textile Wastes and Domestic Sewage. IV—Research in Various Methods of Treatment"—R Hobart Souther and Thomas A Alspaugh, Cone Mills Corp.

Alfred N Henschel, Warwick Chemical Co Div of Sun Chemical Corp, headed the General Technical Session held Thursday afternoon, and which featured the following presentations: "Textile Processing Chemicals"—Lester D Berger, Jr, Fine Chemicals Div, Union Carbide Chemicals Co; "What an Ultraviolet Reflectance Curve Can Tell About a Textile Material"—George Thomson, Charles A Lermond, and Ruth A Kenney, Fabric Research Laboratories, Inc; "Solvay Activated Hydrogen Peroxide Bleaching Process"—William R Steele and S M Rogers, Solvay Process Div, Allied Chemical & Dye Corp; "The Colorimetric Properties of Bleached Cotton"— E S Shanley, Arthur D Little, Inc; and "Recent Developments in Electronic Instruments for Textile Processes"—Richard Hosmer, Electrical Products Div, The Foxboro Co.

"A Glance Into the Future" was afforded those attending the Friday morning session headed by J Edward Lynn, textile consultant. The following papers were presented: "Economic Facts and Figures"—Raymond A Stevens, Arthur D Little, Inc; "High Polymer Prospects"—Herman F Mark, Polytechnic Institute of Brooklyn; "Fabric Trends"—Walter J Hamburger, Fabric Research Laboratories, Inc; "Chemical Trends in the Textile Industry" — Milton Harris, The Gillette Co; and "Nuclear Energy—A New Tool for the Textile Industry"—Henry A Rutherford, School of Textiles, North Carolina State College.

"Textile Processing" was the theme of the Saturday morning session, under the chairmanship of Carlyle Harmon, Chicopee Mfg Co. Seven papers were presented: "Automation

TEXTILE WASTE SYMPOSIUM PANEL—(L to r): R Hobart Souther, Cone Mills Corp; George G Bogren, Weston & Sampson; Joseph C Knox, New England Interstate Water Pollution Control Commission; George O Linberg, AATCC president; Duane W Snyder, Crompton-Shenandoah Co, symposium chairman

GENERAL TECHNICAL SESSION PANEL—(L to r): E S Shanley, Arthur D Little, Inc; W R Steele, Solvay Process Div, Allied Chemical & Dye Corp; George Thomson, Fabric Research Laboratories, Inc; Lester D Berger, Union Carbide Chemicals Co; Alfred N Henschel, Warwick Chemical Co, session chairman

SYMPOSIUM PANEL—"A GLANCE INTO THE FUTURE"—(L to r): J Edward Lynn, consultant, symposium chairman; Alfred N Henschel, Warwick Chemical Co; Herman F Mark, Polytechnic Institute of Brooklyn; Milton Harris, The Gillette Co; Henry A Rutherford, School of Textiles, North Carolina State College; Raymond A Stevens, Arthur D Little, Inc

TEXTILE PROCESSING SYMPOSIUM—(L to r): Walter H Ridley, Foxboro Co; Carlyle Harmon, Chicopee Mfg Corp, symposium chairman; Emil C Hansen, Antara Chemicals; C E Pardo, Western Regional Research Laboratory

with Process Instruments"—Walter H Ridley, The Foxboro Co; "Scouring Grease Wools Neutral"—Emil C Hansen, Antara Chemicals, Div of General Aniline & Film Corp; "Control of Wool Fabric Shrinkage with Polyamide-Epoxide Resin Finishes"—C E Pardo and R A O'Connell, Western Regional Research Laboratory, U S Dept of Agriculture; "Elimination of Static Electricity from Textiles by Chemical Processing"—Emery I Valko and Guiliana C Tesoro, Onyx Oil & Chemical Co; "Effect of Laundering on Chlorine Retention and Crease Resistance of Cotton Finished with Dimethylol Ethylene Urea"—Osborne C Bacon, J E Smith, and L E Hughes, Tech Lab, Organic Chemicals Dept, E I du Pont de Nemours & Co, Inc; "Soiling Studies on Resin-treated Cotton Fabrics"—Robert M Reinhardt, L W Mazzeno, Jr, R M H Kullman, H B Moore, and J D Reid, Southern Regional Research Laboratory, U S Dept of Agriculture; and "Effect of Finishing Treatments on Tear Strength of Cotton Fabrics"—E James Stavrakas and M M Platt, Fabric Research Laboratories, Inc.

The concluding session on Saturday afternoon, under the chairmanship of Charles L Zimmerman, Dan River Mills, featured the following presentations: "The Mechanism of Dyeing Orlon 42"—T Vogel and J M A deBruyne, American Cyanamid Co, and C L Zimmerman, Dan River Mills; "Dyeing of Zefran and Zefran Blends"—A S Messer, The Dow Chemical Co; "The Dyeing of Filament Nylon with Acid Dyes"— H P Landerl, J A Bittles, J A Brooks, and J J Iannarone, Jr, E I du Pont de Nemours & Co, Inc; "Evaluation of Carriers for Dacron Dyeing"—P J Scott, The Tanatex Corp; and "Some Considerations About the Azoic Insoluble Dyes in Printing"—Dorel Marian, Compagnie Francaise des Matieres Colorantes.

1957 TEXTILE DYEING AND FINISHING EXHIBITION———The three-day Textile Dyeing & Finishing Exhibition attracted a great deal of interest, with the Boston daily press giving excellent publicity to the show.

Viewers were treated to a variety of well-planned displays, with equipment and textile chemical suppliers making up twenty-eight of the forty-six exhibits. The additional eighteen exhibits were those of dyestuff manufacturers, fiber producers, testing and service firms, textile publications, and special exhibits of AATCC, ASTM,

Examining the Popular Science Model of America's earth satellite on display at the Hilton-Davis exhibit are: l to r, J Edward Lynn, consultant; G N Nickels, Hilton-Davis Chemical Co; Ernest R Kaswell, Fabric Research Laboratories, Inc; and Raymond J Carey, General Aniline & Film Corp

Participating in the tape-cutting ceremonies, which officially opened the Textile Dyeing and Finishing Exhibition at the 1957 Convention were, l to r: Ernest R Kaswell, convention chairman; George O Linberg, AATCC president; George P Paine, AATCC executive secretary; and Donald H Thomas, chairman of the Exhibits Committee.

and the National Council for Textile Education.

The NCTE exhibit featured pictures and promotional material from the textile colleges as a phase of the Textile Education Committee's promotional program.

Exhibiting for the first time, the AATCC Archives Committee displayed the original documents, letters and papers covering the organization of AATCC, local sections, and Research Committee. A special copy of the "Book of Proceedings of the Perkin Centennial" was located in the booth under a notice requesting that all committee members of the Centennial autograph the copy, which will be placed in the Association Archives.

The AATCC Research exhibit highlighted some of the current research activities of the Association. The display included:

Nelson S Knaggs, vice president, Hilton-Davis Chemical Co, explains the intricacies of the General Electric Earth satellite rocket engine, which was on display at the Hilton-Davis booth, to AATCC President George O Linberg

1) An exhibit by the Committee on Colorfastness to Washing and the AATCC staff showing progress in the development of an accelerated wash test. Here it was shown that two minutes in the Accelerotor has been found to simulate color loss equal to five commercial launderings on eight commercial and four Quartermaster fabrics.

2) An exhibit relative to the two new tentative drycleaning test methods recently introduced and published in the November 18th issue of *American Dyestuff Reporter*. Samples run in the laboratory were displayed opposite those obtained by commercial methods to show the high degree of correlation obtained.

3) Promotional material and subscription blanks for the *Colour Index*.

AATCC Research Exhibit

AATCC Archives Committee Exhibit

General views of Exhibit area

4) An exhibit by the Committee on Colorfastness to Light relative to its completed study of the variables encountered in natural light fading (see pages P861-883 of the November 18th issue of *ADR*).

5) An exhibit showing the excellent reproducibility of the Accelerotor for abrasion testing in inter- and intra-laboratory use.

OLNEY MEDAL LUNCHEON ——Nearly 300 were present at the Olney Medal Luncheon, held Friday noon in the Ballroom, to honor P J Wood, 1957 Olney Medalist.

Mr Wood, technical director of Royce Chemical Co, Carlton Hill, NJ, is the 14th recipient of the Medal, awarded by AATCC "annually, or at such longer intervals as the Committee of Award may elect, to a citizen of the United States, for outstanding achievement in the field of textile chemistry, including the development of chemical agents or chemical processes used in the manufacture of textiles, or methods for their evaluation."

Presentation of the Medal was made by AATCC President George O Linberg, after Milton Harris, a close

OLNEY MEDALISTS IN ATTENDANCE AT 1957 AWARD LUNCHEON

***(Seated, l to r)*: William D Appel (1954); P J Wood (1957); William H Cady (1946); Milton Harris (1945).**

***(Standing, l to r)*: Raymond W Jacoby (1951); Miles A Dahlen (1955); Walter J Hamburger (1956); Werner von Bergen (1952).**

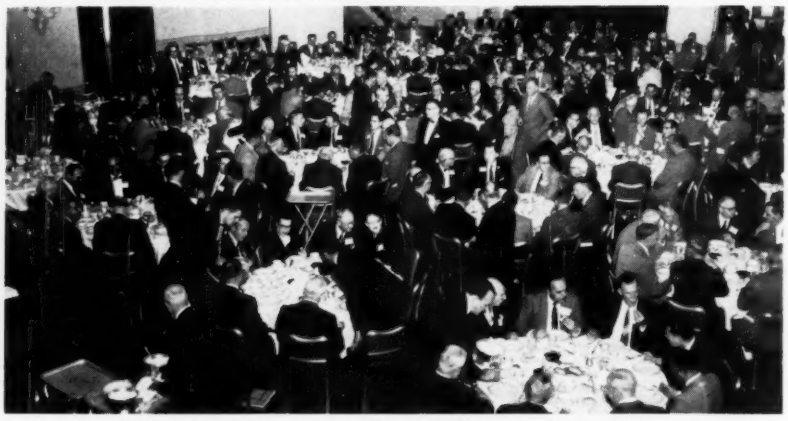
Milton Harris eulogizing "The Medalist"

P J Wood delivering the 1957 Olney Medalist's address, "The Pursuit of Happiness"

Thomas J Gillick, Jr, assistant chairman, delivering introductory remarks at Olney Medal Luncheon

HEAD TABLE. (L to r): Ernest R Kaswell, convention chairman & vice president, New England Region; Weldon G Helmus, vice president, Central Atlantic Region; Walter J Hamburger, 1956 Olney Medalist; Miles A Dahlen, 1955 Olney Medalist; William D Appel, 1954 Olney Medalist; Albert J Royce, president, Royce Chemical Co; Mrs P J Wood; Milton Harris, 1945 Olney Medalist; P J Wood, 1957 Olney Medalist; Thomas J Gillick, Jr, assistant convention chairman; George O Linberg, AATCC president.

P J Wood (left), 1957 Olney Medalist, receives 14th impression of the Medal from AATCC President George O Linberg



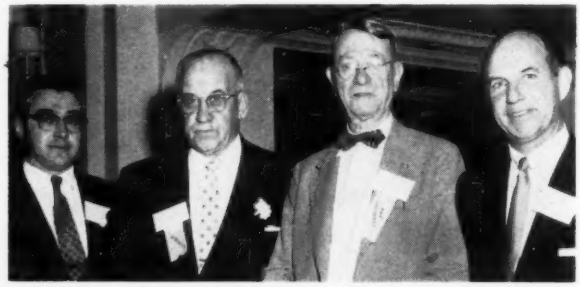
A view of the group attending the Olney Medal Luncheon

friend of Mr Wood and 1945 Olney Medalist, had "indicted" the Medalist. Thomas J Gillick, Jr, assistant convention chairman and chairman of the Western New England Section, presided at the Luncheon.

In his address, "The Pursuit of Happiness", Mr Wood paid special tribute to the late A P "Fritz" Howes, founder of Howes Publishing Co, Inc, which endowed the Medal, and the late Louis A Olney, founder of AATCC and the first Olney Medalist.

In addition to Messrs Wood, Linberg, Gillick, and Dr Harris, the following were seated at the dais: Mrs Wood; Albert J Royce, president, Royce Chemical Co; the four vice presidents of AATCC, Ernest R Kaswell, Weldon G Helmus, H Gillespie Smith, and Elliott Morrill; Executive Secretary George P Paine; Director of Research Harold W Stiegler; National Convention Committee Chairman Frederick V Traut; Walter J Scott, chairman of the Olney Medal Committee of Award; Rev Ross Cannon, who delivered the benediction; Myron D Reeser, vice president, Howes Publishing Co, Inc; and the following previous Olney Medal winners, who were awarded certificates by President Linberg: William H Cady (1946), Raymond W Jacoby (1951), Werner von Bergen (1952), William D Appel (1954), Miles A Dahlen (1955), and Walter J Hamburger (1956).

(L to r): Albert J Royce, president, Royce Chemical Co; Mrs P J Wood; P J Wood, 1957 Olney Medalist



SPEAKERS AT OLNEY MEDAL LUNCHEON. (L to r): Thomas J Gillick, Jr, assistant chairman, who delivered the Introductory Remarks; George O Linberg, president, AATCC, who presented to 1957 Olney Medal to Mr Wood and certificates to previous Olney Medal recipients; P J Wood, 1957 Olney Medalist, who spoke on "The Pursuit of Happiness"; Milton Harris, 1945 Olney Medalist, who discussed, "The Medalist".

BENEDICTION. (L to r): Ernest R Kaswell, convention chairman & vice president, New England Region; Weldon G Helmus, vice president, Central Atlantic Region; Walter J Hamburger, 1956 Olney Medalist; Miles A Dahlen, 1955 Olney Medalist; William D Appel, 1954 Olney Medalist; Albert J Royce, president, Royce Chemical Co; Hubert A Desmarais, who led the signing of the National Anthem; Mrs P J Wood; Milton Harris, 1945 Olney Medalist; P J Wood, 1957 Olney Medalist; George O Linberg, president, AATCC; Thomas J Gillick, Jr, assistant convention chairman; Rev Dr Ross Cannon; Myron D Reeser, Howes Publishing Co, Inc; George P Paine, executive secretary, AATCC; Werner von Bergen, 1952 Olney Medalist; William H Cady, 1946 Olney Medalist; Raymond W Jacoby, 1951 Olney Medalist; Walter M Scott, chairman, Olney Medal Committee of Award; Harold W Stiegler, director of research, AATCC; Frederick V Traut, chairman, National Conventions Committee; H Gillespie Smith, vice president, Southern Region; Elliott Morrill, vice president, Western Region.

INTERSECTIONAL CONTEST COMMITTEE—(L to r): Thomas R Smith, Wiscasett Mills Co; John M Gould, Barre Wool Combing Co, Ltd; Jackson A Woodruff, American Viscose Corp, *chairman;* Kenneth A Howry, Daily News Record. William J Crawford, Cranston Print Works Co, was not present when photo was taken.

INTERSECTIONAL CONTEST SPEAKERS—(L to r): Robert D Robinson, Northern New England Section; R Stewart Wilkinson and William G Wolfgang, Delaware Valley Section; James L Taylor, Southeastern Section; Carl H Brubaker, New York Section; L B Arnold, Jr, Piedmont Section; J A Woodruff, Intersectional Contest chairman (standing).

INTERSECTIONAL CONTEST —— First-place honors in the 1957 Intersectional Contest, which was held on Friday, Nov 15th in the Ballroom, went to the Piedmont Section for its entry, "The Effect of Resin Finishes on the Lightfastness of Vat Dyes—Part II." This was the fourth first-place award for the Piedmont Section, which won the 1956 Contest as well as those held in 1948 and 1950.

Second place went to the New York Section for its entry, "Identification of Dyestuff Classes on Natural and Synthetic Fibers"; and third place, to the Southeastern Section for the paper, "The Effect of Iron and Copper Contaminants on Cotton Degradation in Peroxide Bleaching."

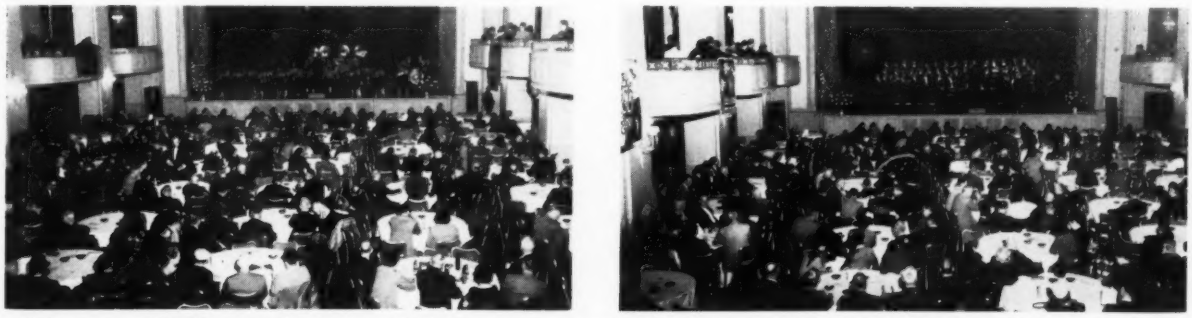
Other entries in the '57 Contest were: "The Study of Lightfastness of Selected Direct Colors on Cotton, Rayon and Cotton-Rayon Blends," by the Delaware Valley Section, and "An Evaluation of Test Methods for Fulled Fabrics," by the Northern New England Section.

INTERSECTIONAL CONTEST JUDGES—(Seated, l to r): John J Hanlon, Hudson-Mohawk Section; Louis R Mizell, Washington Section; Richard B Stehle, chief justice; William S Sollenberger, Delaware Valley Section; Lloyd R Greenwood, South Central Section. (Standing, l to r): Robert H Phillips, Rhode Island Section; Joseph H Jones, Mid-West Section; Herman P Baumann, New York Section; John C Boesch, Piedmont Section; Frank H Cooper, Southeastern Section.

ENTERTAINMENT —— The entertainment highlight of the Convention . . . the joint concert of the Band and Glee Club of Harvard University . . . drew a large crowd to the Ballroom on Friday evening. The Glee Club entertained for the first half-hour, and, following intermission, the Band, more than 100 strong, offered several selections during the second part of the program. The spontaneous and enthusiastic response of the audience "coaxed" the Band into three encores.

The 3-day program for lady guests included tours of historic Boston, Lexington and Concord, Harvard University and Massachusetts Institute of Technology; Friday lunch at Hartwell Farms; and a Saturday trip to the Isabella Gardner Museum, a musicale and tea.

Special tours were arranged for members and guests to visit AATCC Headquarters and Lowell Technological Institute, Lowell, Mass; the Quartermaster Research and Engineering Center, Natick, Mass; the Textile Division and Compton Computation Center at Massachusetts Institute of Technology, Cambridge, Mass; Fabric Research Laboratories, Inc, Dedham, Mass; The Foxboro Co, Foxboro, Mass; and Tracerlab, Inc, Waltham, Mass.



Photos show AATCC convention-goers enjoying program presented by the Band and Glee Club of Harvard University on Friday, November 15, in the Ballroom of the Hotel Statler.

The Harvard University Glee Club entertaining during the AATCC Convention

ANNUAL BANQUET — The Annual Banquet, traditional finale of AATCC Conventions, was attended by approximately 500 members and guests on Saturday evening, at which time Honorary Members, Charter Members, and Past Presidents of the Association were honored.

Convention chairman Ernest R Kaswell, after announcing the registration totals, introduced those seated at the head table (see photo).

Martin J Lydon, president, Lowell Technological Institute, served as master of ceremonies, introducing Jackson A Woodruff, Walter M Scott, and, finally, AATCC President George O Linberg.

Jackson A Woodruff, chairman of the Intersectional Contest Committee, announced the outcome of this year's contest as follows: *First,* Piedmont Section; *Second,* New York Section; *Third,* Southeastern Section. L B Arnold, Jr accepted the first-place award on behalf of the Piedmont Section. (See page P962 for additional details of the Contest).

L B Arnold, Jr (left) accepts first-prize award for the Piedmont Section from Intersectional Contest chairman Jackson A Woodruff

Walter M Scott, chairman, Publications Committee, presented Irving I Berstein, Controls for Radiation, Inc, the 1957 American Dyestuff Reporter Award for the paper "Applications of Radioactivity in the Textile Industry", which appeared in the June 3, 1957 issue. (See page P885 of November 18th issue for complete story).

36TH ANNUAL BANQUET — PRINCIPALS SEATED AT THE DAIS

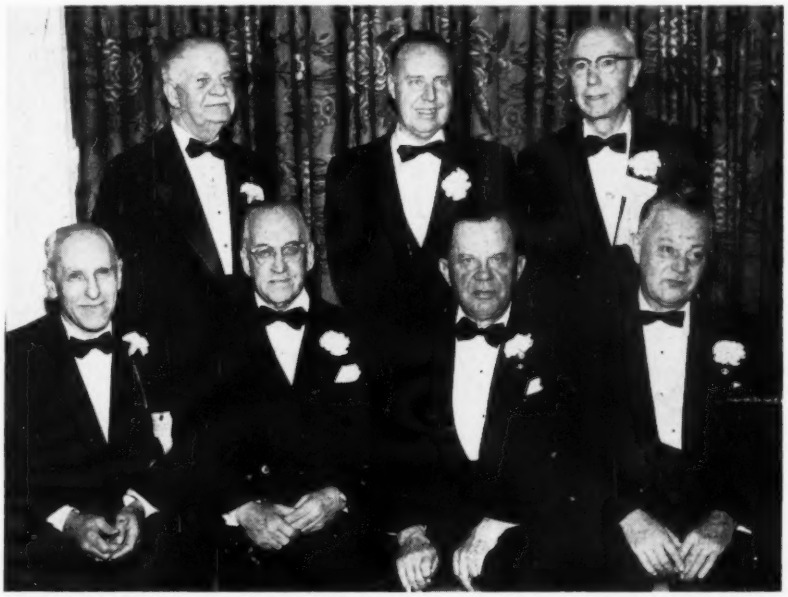
Seated (l to r): **J Robert Bonnar, past president; Charles W Dorn, chairman, Executive Committee on Research; Charles A Sylvester, chairman, Technical Committee on Research; William D Appel, past president; Carl Z Draves, past president; George O Linberg, president; Martin J Lydon, master of ceremonies; C Norris Rabold, past president; Msgr Hally, who delivered the benediction; Raymond W Jacoby, past president.**

Standing (l to r): **Richard R Frey, assistant secretary; Frederick V Traut, chairman, National Conventions Committee; Weldon G Helmus, vice president, Central Atlantic Region; Elliott Morrill, vice president, Western Region; William R Moorhouse, treasurer emeritus & honorary member; Albert E Sampson, past treasurer & honorary member; Ernest R Kaswell, convention chairman & vice president, New England Region; Harold C Chapin, past secretary & honorary member; George P Paine, executive secretary-assistant treasurer; Irving A Berstein, 1957 ADR Award winner; Walter C Scott, chairman, Publications Committee; Jackson A Woodruff, chairman, Intersectional Contest Committee; H Gillespie Smith, vice president, Southern Region; P J Wood, 1957 Olney Medalist; Harold W Stiegler, director of research; Henry F Herrmann, past president**

Following his "State of the Union" message, President Linberg presented Honorary Membership certificates to William R Moorhouse, treasurer emeritus; Harold C Chapin, past secretary; and Albert E Sampson, past treasurer. The fourth living Honorary Member, William H Cady, was unable to attend the Banquet.

Past presidents in attendance who received certificates were: P J Wood, Carl Z Draves, William D Appel, Henry F Herrmann, C Norris Rabold, J Robert Bonnar, and Raymond W Jacoby.

Charter members receiving certificates were: Edward S Chapin, James L Barrington, Edwin W Adams, Leonard S Little, Hibbard S Busby, Michael J Lane, Wallace J Murray, Walter F Prescott, Carroll W Peck, John M Dalton, Harold B Sturtevant, P J Wood, Boyce C Bond, Harold E Gile, Leverett N Putnam, Leon W



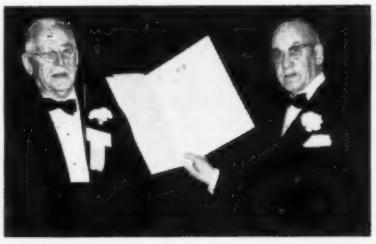
CURRENT PRESIDENT AND PAST PRESIDENTS PRESENT AT 36TH ANNUAL BANQUET

(Seated, l to r): **Carl Z Draves (1940-41); George O Linberg (1957-); Henry F Herrmann (1947-49); C Norris Rabold (1950-52)**

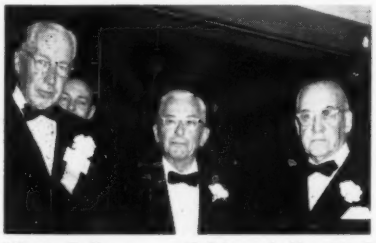
(Standing, l to r): **Raymond W Jacoby (1955-56); J Robert Bonnar (1953-54); William D Appel ((1944-46)**

Irving A Berstein (left), Controls for Radiation, Inc, receives 1957 American Dyestuff Reporter Award from Walter M Scott, chairman, AATCC Publications Committee

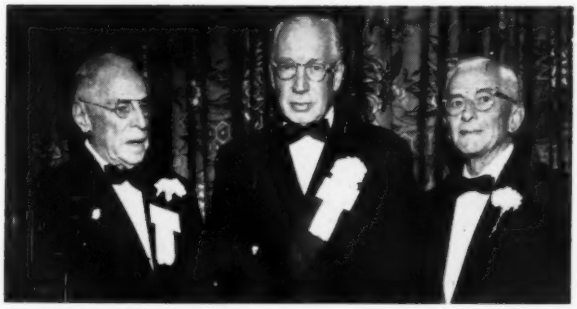
BENEDICTION AT ANNUAL BANQUET—(L to r): Ernest R Kaswell, convention chairman; Msgr Halley; Martin J Lydon, master of ceremonies



William R Moorhouse (left), treasurer emeritus, receives honorary membership certificate from President Linberg.



Albert E Sampson (left) and Harold C Chapin (center), AATCC's newest honorary members, receive certificates from President Linberg.



Three of AATCC's four living honorary members: William R Moorhouse, Albert E Sampson, and Harold C Chapin. William H Cady, the fourth member, was unable to attend the Banquet.

CHARTER MEMBERS HONORED AT 36TH ANNUAL BANQUET

Seated (l to r): **Edward S Chapin, consultant; James L Barrington, Union Color & Chemical Co; Edwin W Adams, consultant; Leonard S Little, consultant; Hibbard S Busby, retired; Michael J Lane, Geigy Dyestuffs; Wallace J Murray, Arthur D Little, Inc; Walter F Prescott, Prescott & Co; Carroll W Peck, George Mann & Co; John M Dalton, consultant.**

Standing (l to r): **Harold B Sturtevant, Rhode Island School of Design; P J Wood, Royce Chemical Co; Boyce C Bond, Metro-Atlantic, Inc; Harold E Gile, United Indigo & Chem Co, Inc; Leverett N Putnam, National Aniline Div; Leon W Sidebottom, retired; Frank W Gainey, retired; Alex Morrison, retired; Harold J Daigneault, National Aniline Div; William R Moorhouse, retired; John M Hood, Erwin Mills; Arthur E Hirst, Standard Chemical Products, Inc; Albert E Sampson, retired; Walter M Scott, U S Dept of Agriculture**

Sidebottom, Frank W Gainey, Alex Morrison, Harold J Daigneault, William R Moorhouse, John M Hood, Arthur E Hirst, Albert E Sampson, and Walter M Scott.

The affair was concluded with an invitation to all those in attendance to meet at Chicago's Conrad Hilton Hotel for the 37th National Convention, to be held October 30-November 1, 1958.

PIEDMONT SECTION REPEATS AS INTERSECTIONAL CONTEST WINNER

THE Piedmont Section successfully defended its Intersectional Contest "championship" at the 36th National Convention by winning the first-place award for the second year in succession. The Section's entry, "The Effect of Resin Finishes on the Lightfastness of Vat Dyes—Part II," was judged the best of the five papers presented at the 18th Contest, held on Friday, November 15, in the Grand Ballroom of Boston's Hotel Statler.

The paper is the fourth first-prize winner from the Piedmont Section since the inception of the Contest in 1940. An annual competition, the Intersectional Contest pits the research committees of the participating Sections, which work throughout the year in the preparation of research papers on current topics of interest to the industry.

L B Arnold, Jr, who served as the Piedmont Section's Contest Committee chairman and speaker last year, again served as speaker. Neal Truslow was this year's chairman for the Section.

Second-place honors went to the New York Section for its paper, "Identification of Dyestuff Classes on Natural and Synthetic Fibers," which was presented by Herman P Baumann. Dmitry A Shiraeff served as chairman of the New York Committee.

Third place went to the Southeastern Section for its entry, "The Effect of Iron and Copper Contaminants on Cotton Degradation in Peroxide Bleaching," which was delivered by James L Taylor. Paul Seydel headed this Section's committee.

Additional entries were those of the Delaware Valley Section, "The Study of Lightfastness of Selected Direct Colors on Cotton, Rayon and Cotton-Rayon Blends," and the Northern New England Section, "An Evaluation of Test Methods for Fulled Fabrics." R Stewart Wilkinson was the speaker and Louis B Cook, the chairman, for Delaware Valley. Robert D Robinson served Northern New England as both chairman and speaker.

The Rhode Island and Washington Sections, which have had outstanding success in the Contest in the past, did not compete this year.

The decision of the judges regarding the Contest winners was announced by Jackson A Woodruff, chairman of the Intersectional Contest Committee, at the Annual Banquet held November 16th.

Chief justice for this year's contest was Richard B Stehle. He was assisted by the following judges representing Sections: Herman P Baumann, New York; John C Boesch, Piedmont; Frank H Cooper, Southeastern; Lloyd R Greenwood, South Central; John J Hanlon, Hudson-Mohawk; Joseph H Jones, Mid-West; Louis R Mizell, Washington; Robert H Phillips, Rhode Island; and William S Sollenberger, Delaware Valley.

* * *

Each of the five papers will be published in its entirety in future issues of the REPORTER.

COUNCIL REPORT

208th Meeting • November 14, 1957 • Lowell, Mass.

A SPECIAL "consumer complaints" investigative committee has been authorized by the Executive Committee on Research, Charles W Dorn, ECR Chairman, reported to Council at its 208th meeting November 14, 1957 in the Trustees Room of Lowell Technological Institute, Lowell, Mass.

Council members, meeting during the national Convention, heard Mr Dorn explain that the Committee will investigate the possibilities for setting up machinery to compile data on consumer complaints having to do with problems relating to consumer use, fabric behavior, and faulty practices in laundering and drycleaning plants.

The Committee will also study compilation of data on other materials in a garment, and problems of unknown origin which cause consumer complaints.

* * *

Councilors also heard from J Robert Bonnar, chairman of the President's Advisory Committee, that the PAC had appointed a subcommittee to develop a plan for an executive committee of the Council. General purpose of this group would be to administer the affairs of the Association between Council meetings. Named to the planning subcommittee were George O Linberg, president; Roland E Derby, treasurer; Ernest R Kaswell, vice-president, New England Region; Mr Bonnar, and George P Paine, executive secretary.

* * *

The need for test methods in the area of industrial end uses of textiles will be investigated by the Technical Committee on Research, Mr Dorn said. TCR will delegate this project to its End Uses Committee; the study will concern itself with non-apparel uses, such as fabrics for coatings, filter cloths, etc.

Mr Dorn also reported that ECR had approved the establishment of a new TCR Committee on the Evaluation of Finishes for Resistance to Staining and Soiling. H B Goldstein was approved as chairman of this committee.

ECR reported at the same time to Council that all research committees are being urged to prepare exhibits of their work for presentation at next year's convention in Chicago, illustrating the history, progress and accomplishments of the different committees. These exhibits, it was noted, would not replace the regular Association headquarters exhibit, but would augment it.

* * *

Council also heard from Sidney M Edelstein, chairman of the Archives Committee, concerning the possibility of establishing an Institute for the History of Dyeing and Finishing, under the aegis of AATCC. Council authorized Dr Edelstein to proceed with a study of the possibility for such an Institute, and report back at a later date.

Treasurer Roland E Derby reported the Association's assets through July 31, 1957, at a total of $527,783.31. Mr Derby also noted that the Association had changed its method of accounting from the cash to the accrual basis. A balance sheet and income statement will be published in a forthcoming issue of *American Dyestuff Reporter*.

* * *

President Linberg, who had been chairman of the 1946 and 1952 AATCC Conventions in Boston, welcomed Council members and Committee chairman to the 1957 Convention, headquartered in Boston's Statler Hotel. Registration for the current convention exceeded 1,700, according to final reports.

Executive Secretary Paine welcomed the Councilors to AATCC headquarters, and prior to the Council meeting conducted a tour of the national offices, AATCC laboratories and Lowell Technological Institute.

* * *

Reporting for the Membership and Local Sections Committee, Chairman Weldon E Helmus offered for study a suggested guide for Section officers, which was developed in cooperation with the Sections themselves. This guide will be further studied and changes suggested by Sections will be incorporated before wider distribution is made.

Mr Helmus reported that individual memberships presently total 6,997, not including corporate memberships. Councilors were also queried on possible sales for a suggested individual-membership certificate, and it was decided Section chairmen should be contacted in an effort to determine the potential market for these certificates.

Mr Helmus, Central Atlantic region vice-president, also reported that the New York Section desired to change its name to the Metropolitan Section, since membership included members in New Jersey as well as New York. Council approved this name change, and the matter was referred to the Constitution and By-laws Committee for necessary action.

Ernest R Kaswell, New England regional vice-president and Convention Chairman, reported that New England was planning a regional seminar meeting in September of 1958, be held on Cape Cod. Further details, Mr Kaswell said, would be available later.

Other regional vice-presidents, Elliott Morrill of the Western Region, and H Gillespie Smith, of the Southern Region, reported on their activities and visits to Sections.

* * *

Status of the *Colour Index* was reported by Albert E Sampson, chairman of the *Colour Index* Marketing Committee. He said only 900 copies of the *Colour Index* are still available. Once this supply is exhausted, he noted, copies must then be purchased direct from England and purchasers will incur additional expenses of shipping, duties and bookseller's charges. The remaining copies will be available on a first-come, first-served basis from National Headquarters, Box 28, Lowell, Mass.

* * *

Walter M Scott, chairman of the Publications Committee, reported this Committee had decided to postpone any action in developing proposed AATCC promotional literature on textile chemistry education—in view of the facts that many textile schools now have excellent material of their own in this area, and a number of associations in the field have also been active along this line.

Carl Z Draves was appointed a new member of the American Dyestuff Reporter Award Committee. This group now consists of Richard B Stehle, *chairman*, Hector C Borghetty, and Dr Draves.

Mr Kaswell, chairman of the Howes Contract Committee, reported that a new contract between AATCC and the Howes Publishing Co, Inc had been signed. He reviewed the terms of the contract for Councilors and noted that negotiations had been entirely pleasurable throughout. Council then discharged this committee with thanks for work well done.

President Linberg later commented that the signing of the new contract "has opened another era of harmonious and cooperative relationship between the two organizations."

Council also discharged two other special committees: The Legal Committee, which had been charged with investigating and recommending legal counsel for the Association; and the Perkin Centennial Committee.

Raymond W Jacoby, chairman of this latter Committee, reported to Council that the Association's affairs in connection with the Perkin Centennial had been concluded. Council accepted Mr Jacoby's final report, and appropriated funds to conclude payment of remaining bills. The Committee was then discharged with thanks.

Frederick V Traut, National Convention Committee Chairman, noted details of the next two national conventions: 1958, Conrad Hilton Hotel, Chicago, Oct 30, 31 and Nov 1, Elliott Morrill, *chairman;* 1959, Sheraton Park and Shoreham Hotels, Washington, Oct 8, 9 and 10, George Fulton, *chairman.*

Albert E Johnson, chairman of the Corporate Membership Committee, summarized the corporate membership situation at present. Payments presently total over $58,000, and the present program will be continued in future years. Mr Johnson asked the corporation of corporate membership chairmen in various sections in providing leads on new membership possibilities.

Next meeting of the Council will be January 24, 1958, in New York at the Statler Hotel. Following this, meetings will be held May 23, 1958, in Philadelphia, Pa, and September 19, 1958, at Charlotte, N C.

(Copies of the official minutes of this 208th Council meeting will be mailed automatically to Councilors, chairmen of Council Committees and Chairmen of Local Sections when they have been prepared by the executive secretary's office. Other Association members may obtain a copy by writing to the executive secretary, American Association of Textile Chemists and Colorists, PO Box 28, Lowell, Mass).

ELECTED TO MEMBERSHIP

November 14, 1957

SENIOR

Lionel A. Cox
Bert H. Eastridge
Herbert W. Eckweiler
Henry Tovey
William H. Armento
Martin F. Dunbar
Raymond G. Furge
Joseph J. Halleck
Howard M. Henze
Paul A. Homier
William G. Huey
John Hunter
Karl J. Klein
Eduardo N. Lopez
William B. Macke
Jack F. Morgan
Roger L. Rounds
Horacio Scherb
Harold Simon
Albert F. Strobel
William E. Wallace
A. J. Cofrancesco
L. T. Eby
J. J. Hayden
F. H. Lieb
Fred K. Walger
J. T. Manning
A. F. Plue
D. A. Plue
T. R. Scott, Jr.
H. L. Urban
E. I. Welles
George B. Dohring
Robert D. Easdon
Charles R. Howard
Paul H. Hughson
Robert J. Keithley
Esley O. Langerak
Charles G. McClimon, Jr.
Rural E. Meadors
Lloyd E. Parks
Fred W. Rathgeb
Francis W. Rhodes
Richard F. Atwood
Irving P. Batt
Salamon Bayon
Earl F. Bowers
James A. Byars
John B. McElveen
William A. O'Brien
Doris Jones Redwine
Edward C. Roche

JUNIOR

Robert N. Josey
John W. Albert
R. W. Boyer
M. J. Mathias
Harold A. Hedgecock
Edwin A. Johnson
Kenneth W. Prodo
Stanley J. Sieczowski
Armand A. Zaleon

ASSOCIATE

Jorge A. Lorentz
R. D. Cumming
J. P. McNally
G. M. O'Mahony
R. H. Winter
Irving Ash
Jerald T. Cooper
James D. Crowder
Dennis B. Faw
Albert J. Johnston, Jr.
John E. Gingrich
George W. Ogden

STUDENT

Andre Leblanc
Abdul R. Adamjee
Jerome P. Alpin
Rafael Akyuz
P. Balasubramanian
Eddie M. Barringer
Hugh C. Bennett
Joseph H. Bloom
D. S. Dalal
Earl S. Dunlap
Stanton A. Freedman
Robert F. Gracia
Kenneth K. Griffin
Edward W. Harris
Willie L. Hodge
John W. Kennette
Carle W. Mason
Lawrence J. Moran
Stefan T. Mulawka
John W. Mix
Ronald S. Perry
Marcel Menard
Gaston Plante
Lalande Viateur
Jonathon Rivlin
Maurice I. Seifer
Bernard J. Sweens
M. Venkataswamy
Daniel D. Ward

TRANSFERRED FROM OTHER CLASSIFICATION TO SENIOR

Roger L. Pruitt
William T. Roff, Jr.
Thomas Hatchett
Charles T. Burgess
John S. Brice
Robert S. Brooks
William A. Geiler
James H. Holmes
Sal Mailo
Warren E. Tiller
Charles R. Williams
Wilburn P. Williams
Richard E. Kimble
Thomas C. Manzolillo
John Thackrah

1957 Convention———

SOLVAY ACTIVATED HYDROGEN PEROXIDE BLEACHING PROCESS*

WILLIAM R STEELE and S M ROGERS
Solvay Process Division
Allied Chemical & Dye Corp

W R Steele

W R Steele majored in chemistry and mathematics at Syracuse University, graduating with an A B degree in 1925. He was immediately employed as a chemist by the Solvay Process Division of Allied Chemical & Dye Corp at their main laboratory at Syracuse, N Y. He has been with them continuously ever since.

For the past 20 years he has been engaged in technical service work, more recently as manager of the Textile Section. He has done extensive investigational and field work for the cotton, rayon, and wool industries, particularly in connection with the recovery, evaporation, purification, and re-use of caustic soda, the disposal of waste, and the bleaching of cotton, wool, and synthetic fibers. He has developed textile processing procedures, particularly equipment and methods for mercerizer tender-frame washing, dialytic purification of caustic soda, and disposal of textile waste. He holds several patents in these fields.

S M Rogers was graduated as a chemical engineer from Rensselaer Polytechnic Institute in 1920. For the next twelve years he was connected with the oil industry, being with Vacuum Oil Co for ten years as a member of the Product Development and Research Laboratory. The next few years he was in charge of the analytical section of the St Regis Paper Company's main laboratory. In 1936 he became associated with the Solvay Process Division, where he is at present a senior chemist.

For the past sixteen years his work has involved the purification, mercerization and bleaching of textiles, wool shrinkage, and the bleaching of wood pulp. He developed certain testing methods, a continuous hypochlorite bleaching process, the Solvay activated peroxide bleaching sequence and holds several patents in this field. He also originated the Solvay method of producing chlorine dioxide, which is used widely throughout the pulp industry as a bleaching agent.

S M Rogers

INTRODUCTION

PRIOR to the eighteenth century, all actual bleaching of cotton was done by the sun's rays. This restricted operations to certain localities and to specific periods of the day and year.

In 1785, Berthollet, a French chemist, conceived the idea of using chlorine water. While improved whiteness was obtained, inadequate control resulted in weakened cloth. In 1789, Charles Tennant, an Englishman, patented a process for absorbing chlorine gas in a solution of the inexpensive milk of lime. One year later, Tennant succeeded in patenting a process for the manufacture of bleaching powder by the absorption of chlorine gas in dry hydrate of lime. In 1820, Labarraque prepared sodium hypochlorite by saturating soda lye with chlorine gas. From then on, calcium and sodium hypochlorite were used more or less exclusively for bleaching cotton textiles until hydrogen peroxide was introduced.

For many years, Solvay has had an active interest in the cotton textile industry, recognizing it as an important market for alkali, chlorine, and related materials. During the 1930's, fundamental information regarding sodium hypochlorite bleaching of cotton cloth was developed. In the middle 1940's, research was directed to developing a method of bleaching continuously with sodium hypochlorite. It was demonstrated in the laboratory that cotton cloth, if adequately desized and purified, could be bleached continuously with sodium hypochlorite to high whiteness without harming the fabric. These results were sufficiently encouraging to justify proceeding on a commercial scale. Cooperative tests were conducted at a large bleachery in the Southeast on a semicommercial scale. The results, as compared with both the standard kier-chemic process and hydrogen peroxide bleaching, were so satisfactory from cloth quality and cost standpoints, that equipment was purchased to convert about half of the bleach operation to the Solvay method. Since that time, a major part of the total bleaching done there has been by this method. This process is covered by US Patent 2,602,723, "Continuous Hypochlorite Process for Bleaching Cotton Textiles."

In bleaching with sodium hypochlorite, cloth usually has to be purified to a greater extent than with peroxide. While about equal whiteness can be obtained, the color tendency is considered poorer by many, and some textile experts contend that reversion is greater. Certain dyestuffs stand hypochlorite better than peroxide; others have to be bleached with peroxide. An antichlor usually has to be used after hypochlorite bleaching. In the case of continuous hypochlorite bleaching, costs are slightly higher for equipment and labor, but lower for chemicals and steam.

Several years ago sodium chlorite was brought forth for cotton bleaching. To promote commercial acceptance, a continuous process and equipment for performing it, particularly the "steamer," were developed. In the steamer, cloth wet with the bleaching

*Presented by William R Steele on November 14, 1957 at the 36th Annual Convention, Hotel Statler, Boston, Mass.

agent is carried on a belt through a steam-filled chamber. The high cost of sodium chlorite retarded widespread usage.

Development by Solvay of a method for the manufacture of chlorine dioxide, and application for bleaching cellulose in the pulp and paper industry, aroused interest in the possibilities of chlorine dioxide for bleaching cotton. In 1952, a laboratory investigation was undertaken at Syracuse in cooperation with a Southern bleachery to develop comparative data for hypochlorite, chlorite, chlorine dioxide, and peroxide.

It has been proven that sodium chlorite and chlorine dioxide are reasonably efficient bleaching agents for cellulose, including cotton. However, they have not been particularly acceptable as cotton bleaching agents because of high cost or necessity of installing individual generating units, as well as hazard. Also, in the case of chlorine dioxide, it is necessary to install special corrosion-resistant bleaching equipment, and to bleach batchwise at elevated temperatures in gas-tight vessels.

Hydrogen peroxide has been employed for textile bleaching for at least 35 years, partially supplanting competitive bleaches, such as hypochlorites. The continuous hydrogen peroxide system for bleaching woven cloth involves saturating the goods with caustic soda, steaming, washing, saturating with hydrogen peroxide plus additives, steaming and washing. The additives usually employed are sodium silicate (water glass) and caustic soda. The function of the silicate is to control the release of oxygen from the peroxide. The function of the caustic is to minimize formation and precipitation of silica complexes.

Development of continuous processing methods and excellent control techniques, together with good technical and sales service, so increased the popularity of hydrogen peroxide, that at the present time approximately 80% of all cotton textiles are bleached with peroxide.

A considerable portion of the hydrogen peroxide introduced into a given bleaching operation goes down the sewer. Hydrogen peroxide bleaching is expensive and in many cases this cost is not really justifiable. Silica complexes, from the silicate used for stabilization, form and precipitate on both the cotton and the equipment. Highly purified water, such as filtered softened water, quite often has to be employed for post-bleaching washing to minimize pickup and retention of hardness salt complexes, which decrease absorbency, promote non-uniform dyeing, and cause localized fiber degradation.

In view of the widespread interest in Solvay's cooperative work with bleacheries for the past 15 years in connection with the reduction of stream pollution and the lowering of cotton finishing cost by recovery and re-use of mercerizing caustic, it was thought that the textile industry would be more interested in saving peroxide than in finding a new stabilizing agent.

Several possible ways of conserving peroxide were investigated; eg, flash bleaching, preliminary solvent extraction, usage of compounds to activate excessively stabilized peroxide, ultrasonics, variation of the ratio of cloth surface to liquor volume, and two-stage peroxide bleaching. None of these were successful.

Convinced that not any of the present bleaching compounds are ideal, and freed from the necessity of promoting one particular material irrespective of merit because of ability to furnish all of the commonly used bleaching compounds or the basic materials employed in their manufacture, Solvay directed attention to employing bleaching agents in combination.

EXPERIMENTAL

Usage of hypochlorite in conjunction with peroxide proved to be promising from the very start. Consequently, optimum sodium hypochlorite bleaching conditions were established, eg, type and concentration of sodium hypochlorite, pH, bleaching time and temperature, and maximum possible reduction of peroxide and additives.

It was found that if, immediately before peroxide bleaching, the cloth is saturated for about one minute with a one g/l solution of sodium hypochlorite (prepared by chlorinating caustic soda), squeezed to about 100% wet-out, allowed to stand 10-20 minutes at room temperature, and then *without washing* treated with peroxide plus additives, the peroxide and additive demand can be reduced greatly and the quality of the cloth improved significantly.

The cloth used in these experiments was an 80 x 80 *4.00* print. This had been singed, desized, and caustic-purified. After being bleached in a textile mill, this material had a whiteness of 86.7. Duplication of the mill procedure in the laboratory produced a whiteness of 86.9 and a fluidity of 2.43. Prebleaching with hypochlorite reduced consumption of hydrogen peroxide and additives 50% and produced cloth of higher quality, ie, a whiteness of 87.6 vs 86.9, and a fluidity of 2.34 vs 2.43.

These findings were disclosed to various bleacheries. Several experimented with the new Solvay bleaching procedure in their laboratories. In all cases except one, the results on different cloth weights were favorable.

At one bleachery, the pH of the bleached cloth was higher than that bleached with peroxide in the regular way. This higher pH was considered to be detrimental in subsequent processing. It was noted that the hypochlorite was made by chlorinating soda ash rather than sodium hydroxide. Consequently, the excess alkalinity was sodium carbonate and sodium bicarbonate rather than sodium hydroxide. Both the sodium carbonate and the sodium bicarbonate carried through into the peroxide saturator. There, the sodium bicarbonate was converted to sodium carbonate by the sodium hydroxide added with the hydrogen peroxide. This caused a considerable quantity of sodium carbonate to accumulate in the saturator liquor. Deposition of silica complexes in the cotton and on the equipment was promoted; also water requirement for washing was increased, or the residual alkali content of the goods was increased when washing was inadequate.

Later this mill bleached 20,000 yards of 80 x 80 *4.00* cloth, using a caustic type hypochlorite compared with a regular peroxide bleach. The results are shown in Tables I and II.

TABLE I

Bleach	Chemicals reduced	Whiteness At once	Whiteness After 23 wks	Reduction	Absorbency	Fluidity	% Ash
Regular	none	86.8	85.0	1.8	28.9	5.45	0.17
Solvay	½	88.5	88.2	0.3	40.1	3.05	0.13

TABLE II
Analysis of ash

Metals ppm in cloth

	Regular	Solvay
Silica	340	60
Calcium	225	150
Magnesium	30	19
Iron	6.1	4.8
Manganese	1.0	0.9
Titanium	5.0	trace
Chromium	2.0	trace
Lead	1.0	trace

TABLE III

Bleach	Chemicals reduced	Whiteness	Absorbency	Fluidity	% Ash
Regular	none	76.7	16.6	2.0	0.26
Solvay	½	80.2	19.9	2.1	0.17

TABLE IV

Minutes	Whiteness	Fluidity
60	91.2	4.6
30	91.1	3.7
15	90.8	3.5

TABLE V

Minutes	Fluidity
10-20	3.0
60	5.2
180	6.7

Another mill bleached 98 x 54 *1.56* twill by the Solvay method and the results are shown in Table III.

As more mills became interested, we were questioned often about the possibility of reducing the peroxide bleaching time and about the danger of degradation if the lay time of the cloth in the hypochlorite exceeded the recommended 10-20 minutes.

It was found that peroxide bleaching time can be decreased with only a small sacrifice in whiteness (See Table IV.)

It was determined that no serious degradation (of 80 x 80 *4.00* print) takes place with lay times in sodium hypochlorite of up to 180 minutes. (See Table V).

DISCUSSION

The distinctive step of the Solvay Activated Hydrogen Peroxide Bleaching Process is a short prebleach just before treatment with the peroxide. During a one-minute interval, the cotton is saturated at room temperature with its own weight of sodium hypochlorite (prepared by chlorinating caustic soda) of sufficient concentration to add to the cloth (air-dry basis) about 0.10% of sodium hypochlorite. Depending upon such factors as cotton absorbency and efficiency of saturation, the concentration of the hypochlorite may vary from 1 to 4 g/l. When the cloth thus treated contacts the peroxide solution, all of the residual hypochlorite is decomposed immediately by an equivalent quantity of hydrogen peroxide:

$$NaClO + H_2O_2 \longrightarrow NaCl + H_2O + 2(O)$$

The released oxygen is believed to be consumed in useful bleaching and the remaining hydrogen peroxide completes the work. Since a considerable increase in whiteness is produced by the hypochlorite, much less peroxide and additives are required than in a regular peroxide bleach. Generally the peroxide and additives can be reduced 50%, but in one case the reduction amounted to 87%.

The additives can be reduced somewhat more than the peroxide because unused sodium hydroxide in the hypochlorite carries over and is available for further use whereas a small quantity of the peroxide is consumed by reaction with the residual hypochlorite.

Since both the yarn or cloth and the processes associated with bleaching vary from mill to mill, it is recommended that scout laboratory bleaching tests be made by Solvay to establish how much it is possible to reduce the peroxide and additives. Accordingly, an interested mill is asked to submit:

1) A sample of the yarn or cloth to be bleached, which has been processed to the point of per-peroxide bleaching procedure,
2) A sample of the same material after regular peroxide bleaching, for evaluation of physical and chemical characteristics to be matched or exceeded by the hypochlorite-peroxide process.
3) A detailed description of regular peroxide bleaching procedure, including concentration in the bleaching solution of hydrogen peroxide and each additive, as well as temperature, retention time, and the like.

Cotton yarn and cloth (both woven and knitted) have all been bleached commercially by the Activated Hydrogen Peroxide Bleaching Process. Some examples of commercial processing are as follows:

A) In the case of woven cloth bleached by the continuous saturator—J box peroxide process, the hypochlorite step follows the washing after caustic soda J boxing, and precedes saturation with peroxide plus additives. Extra equipment includes a saturator and a J box of sufficient size to provide the 10-20 minute contact time at room temperature. A saturator made of concrete and equipped with rubber squeeze rolls and a wooden J box with a polyethylene sheet lining have proven to be satisfactory and economical; however, those fabricated of other resistant materials can be employed if desired.

B) In batch kier procedures, where the cloth is washed outside the kier and reloaded into the same or another kier, the hypochlorite step follows washing after kiering and precedes reloading. At this point, the cloth is saturated with the required quantity of hypochlorite and put through a small J box at room temperature prior to repiling mechanically with the peroxide liquor in the kier.

When the cloth is processed entirely in the same kier (ie, not turned over), following the caustic boil and washing, hypochlorite liquor at room temperature carrying the required quantity of available chlorine is introduced. This is circulated for 10-20 minutes and then drained out. The peroxide liquor (with chemical components suitably reduced) is then introduced and the bleaching continued in the regular manner. The kier, pipe lines, and pump should be resistant, or made resistant to hypochlorite; for example, by painting with a mixture of cement plus sodium silicate.

Knitted cloth and yarn (particularly when optical dyes are used) require special individual handling by formulations supplied by Solvay.

CONCLUSION

Advantages of the Solvay Activated Hydrogen Peroxide Bleaching Process are:

1) It reduces consumption of peroxide and additives by as much as 50%. At a bleachery using 20-4000-gallon cars of 35% hydrogen peroxide annually, a gross savings of up to $72,000 is possible with an extra equipment cost of only about $10,000. At a bleachery using 4-4,000-gallon cars, the saving is of the order of $12,000 with an extra equipment cost of about $3,000. In addition, the need to filter and soften the water used for post-bleaching washing is reduced with corresponding further economy.

2) Coincidentally, it improves the quality of the yarn or cloth. Whiteness, whiteness retention, and absorbency are increased. Both fluidity and ash are generally reduced. Adsorption of silica complexes and other metals in the cloth and on the equipment is reduced.

Solvay has applied for patent protection, but is licensing the process to bleacheries on a royalty-free basis.

New York Section—

THE CHEM-ACRIL PROCESS FOR THE UNION DYEING OF ACRILAN-WOOL BLENDS*

WALTER H HINDLE
Associate Director
Textile Research Departments
The Chemstrand Corp
Decatur, Ala.

The Chem-Acril Process dyes solid shades in dyeing times similar to those for 100% wool. The key to the new method is the use of dye-cation complexes, with studies disclosing a selected group of cation-active dyeing assistants possessing the desired properties.

INTRODUCTION

ACRILAN[1] is unique among the newer man-made fibers in that it was designed so that it could be dyed by existing wool dyestuffs and by methods closely similar to those in general use for wool. Incorporated with the acrylonitrile, of which the fiber is at least 85% composed, was a weakly basic material calculated to give Acrilan a dyeability closely similar to that of wool. In the dyeing of 100% Acrilan, the original concept of dyeing proved to be correct, and until the advent of basic and disperse dyeing systems somewhat later in the history of Acrilan, represented the most satisfactory method of dyeing a full shade range. However, in the dyeing of blends of Acrilan and wool, because of the faster dyeing rate of wool, union shades were very difficult to obtain and it was usually found that the wool dyed almost to the complete exclusion of the Acrilan component of the blend. The problem was further complicated by the fact that, although Acrilan would dye well with wool-type dyestuffs, a lower pH was normally required than for wool in order to obtain maximum color utilization and to effect full fiber penetration. These complications in applying neutral wool dyestuffs to Acrilan-wool blends, where the dyeing rate of the wool was already more rapid than that of the Acrilan, using sufficient sulfuric acid to give full fiber penetration, were indeed serious. However, those dyestuffs, such as the acid metalized types that are normally applied to wool from high concentrations of sulfuric acid, could be used to produce union shades. The quantities of sulfuric acid used by this system of dyeing ranged from 8 to 12% owf and dyeing times of five to six hours were required to effect good unions. Aside from the large quantities of sulfuric acid used, this system of dyeing suffered by the fact that the lightfastness of the light-to-medium-shade areas was usually poor because of the lack of a satisfactory blue element. It became obvious, then, that to rély on the basic concept of a dyeability similar to that of wool was, in itself, not sufficient to solve the problem of union dyeing Acrilan-wool blends and that improved methods would have to be developed.

The first generally used method in solving the problem was the cation-transfer system. This system of union dyeing Acrilan-wool blends was based on dyeing the wool component of the Acrilan-wool blend by techniques normally used in applying a given dyestuff to wool. This, of course, resulted in the wool being dyed to the exclusion of the Acrilan. Sulfuric acid and a specific quaternary ammonium compound were then added to the dyebath, which resulted, in the case of the preselected dyestuffs, in a desorption of dyestuff by the wool and absorption by the Acrilan to give the same shade on both fibers. Doubtless due to this movement of dyestuff, dyeings carried out this way were exceptionally uniform and many hundreds of pieces were dyed by this method on a commercial basis. This system of dyeing was dependent on careful dyestuff selection and, although many neutral and acid milling dyestuffs could be used, the neutral-dyeing premetalized dyestuffs were not amenable to this process, with resultant weakness of lightfastness in certain menswear shades. Furthermore, although the dyeing was a single-bath operation, it had to be considered "two step," and with the demand for high-speed production it became apparent that further work would have to be done.

The next method to be used on a commercial basis was the acid pretreatment process. In this method the dyeing rate of the Acrilan component of an Acrilan-wool blend was increased by a predyeing treatment with sulfuric acid. The fabric to be dyed was treated at 200-210°F in 2 g/l sulfuric acid for 20-30 minutes, after which it was rinsed cold. A nonionic dispersant was added to the bath and dyeing took place using selected wool dyestuffs including the neutral-dyeing premetalized types. The effect of the acid pretreatment was to increase the dyeing rate of the Acrilan, and this was done to such an extent that in the early stages of the dyeing operation, at temperatures up to 150°F, the Acrilan appeared heavier than the wool component. From 150°F to 200°F, the wool dyeing rate assumed dominance, but close to the boil a transfer of dyestuff from the wool to the Acrilan started to give union shades in two- to three-hours dyeing times. Once again, many hundreds of pieces were dyed by this method. The salient point in this method was control in rate of temprature rise. By this method, the times of dyeing had become closely similar to those of 100% wool. The lightfastness of the neutral-dyeing premetalized dyestuffs still gave cause for concern in certain menswear shades and, although the acid pretreatment method was being used extensively, it became apparent that still further basic work was required to have a completely satisfactory all-round dyeing picture.

Considerable time has been given to the prior art in the dyeing of Acrilan-wool blends, in order that the importance of the latest developments may be fully appreciated.

DISCUSSION

The latest development in the union dyeing of Acrilan-wool blends is called the Chem-acril process and involves addition of cationic and non-ionic materials to the dyebath without pretreatments. These commercially available materials, in conjunction with sulfuric acid and dyestuffs selected from all the types of wool dyestuffs, yield union shades within dyeing times commercially accepted for wool.

The cationic material, which is called Chem-acril, has several functions which will be discussed in detail.

*Presented before the New York Section on October 18, 1957 at Kohler' Swiss Chalet, Rochelle Park, N J. The author presented the paper originally at the Annual Symposium of the Society of Dyers and Colourists in Buxton, England, September 19, 1957.

[1]Reg trademark for The Chemstrand Corporation's acrylic fiber

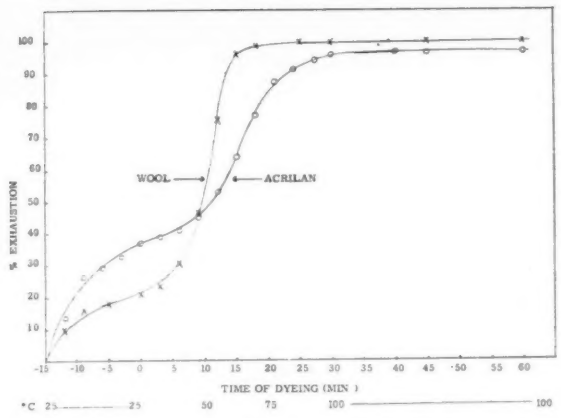


Figure 1

Exhaustion rate curves for Acrilan and wool

0.50% Fast Scarlet BA, 1.5% X-67, 4.0% H_2SO_4, 50:1 liquor ratio

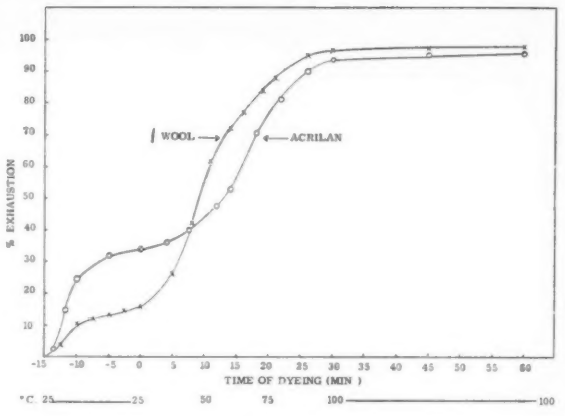


Figure 2

Effect of A-203 on exhaustion rate curves for Acrilan and wool

0.50% Fast Scarlet BA, 1.5% X-67, 0.75% A-203, 4.0% H_2SO_4

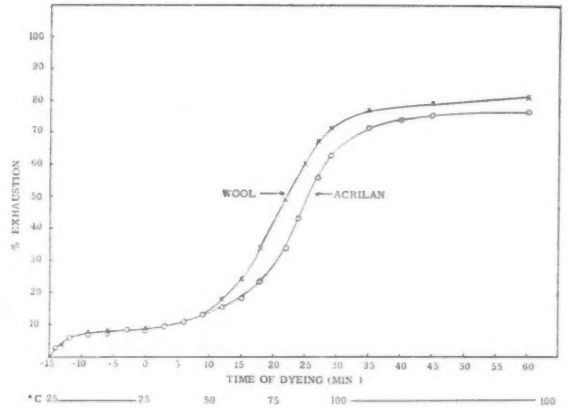


Figure 3

Effect of A-203 on exhaustion rate curves for Acrilan and wool

0.50% Fast Scarlet BA, 1.5% X-67, 3.0% A-203, 4.0% H_2SO_4

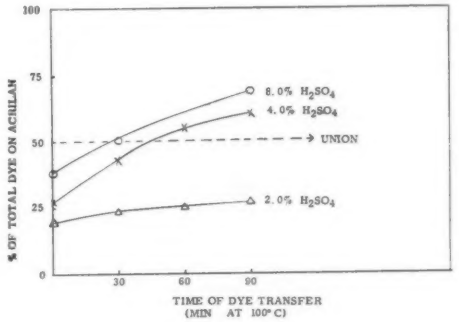


Figure 4

Effect of H_2SO_4 concentration on dye transfer in the presence of A-203

0.6% Fast Scarlet BA, 1.5% X-67, 0.75% A-203

The dyeing rates of 100% wool and 100% Acrilan are plotted in Figure 1. For this work, a neutral acid dyestuff, Fast Scarlet BA (old *CI* 280; new *CI* 26905), was used and applied under conditions of pH best suited for Acrilan. Under these conditions, the rapid exhaustion rate of the wool is observed while that of the Acrilan is seen to be slower. Under these conditions of dyeing, it can readily be understood why a union between the two fibers becomes impossible.

Figure 2 shows the effect on the dyeing rate of the two fibers dyed independently using 0.75% Chem-acril. The dyeing rate of the wool has been sharply reduced while that of Acrilan remains unchanged. It can be conceived that union between the two fibers, when dyed competitively, is feasible. A glance at the dyeing rates of the two fibers still shows that the Acrilan dyes at a faster rate at low temperatures.

Figure 3 shows the effect of the addition of 3% Chem-acril on the dyeing rates of 100% wool and 100% Acrilan under the lower conditions of pH suitable for Acrilan. The curves are closely similar but the percent dyestuff exhaustion has been reduced.

The conclusion to be drawn from the first three graphs is that, under the pH conditions required for the optimum dyeing of Acrilan, the dyeing rate of wool is decreased by the addition of the Chem-acril dyeing assistant to the point where it is similar to that of Acrilan.

Samples of Acrilan-wool blends were dyed from a bath containing 0.75% of Chem-acril, 1.5% of a nonionic, 0.6% of Fast Scarlet BA and 2, 4 and 8% of sulfuric acid.

Figure 4 shows that, assuming 50% of the dyestuff on each fiber to represent a condition of union, using only 2% of sulfuric acid results in the sorption of no more than 25% of the dye on the Acrilan after 90 minutes dyeing time. However, by using 4% of sulfuric acid, the theoretical union is attained in 45 minutes and transfer apparently continues to the point where 60% of the dye is on the Acrilan in 90 minutes. By using 8% of sulfuric acid, union is attained in 30 minutes with a still greater overbalance in 90 minutes. An ideal quantity of sulfuric acid in this case in relation to a desirable dyeing time would appear to be about 3% where a union in 90 minutes can be extrapolated.

These data demonstrate the importance of acid concentration.

Figure 5 shows data on another function of Chem-acril.

Two samples of 100% wool were dyed with 0.6% Fast Scarlet BA, 1.5% Triton X-67, and sufficient ammonium sulfate to exhaust the baths completely. To one bath was added 0.75% Chem-acril. At the conclusion of the dyeing period, 4% of sulfuric acid was added to the dyebaths. To each of these dyebaths was added a sample of undyed Acrilan after a corresponding weight of dyed wool had

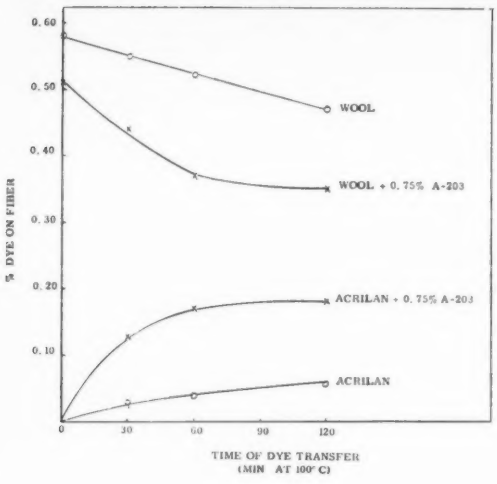


Figure 5
Effect of A-203 on dye transfer
0.6% Fast Scarlet BA, 1.5% X-67, 4.0% H_2SO_4

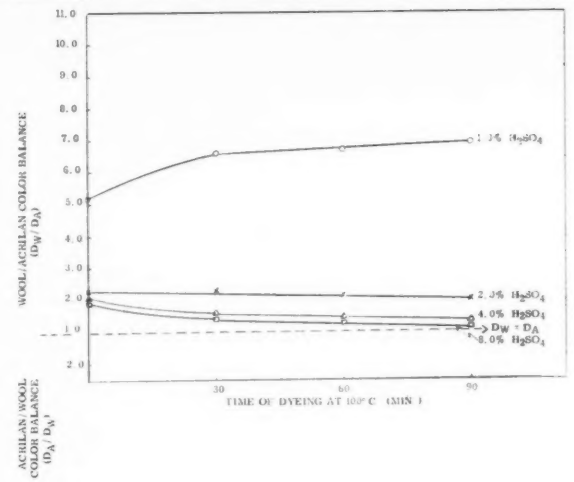


Figure 6
Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance
0.5% Fast Scarlet BA, 0.0% A-203

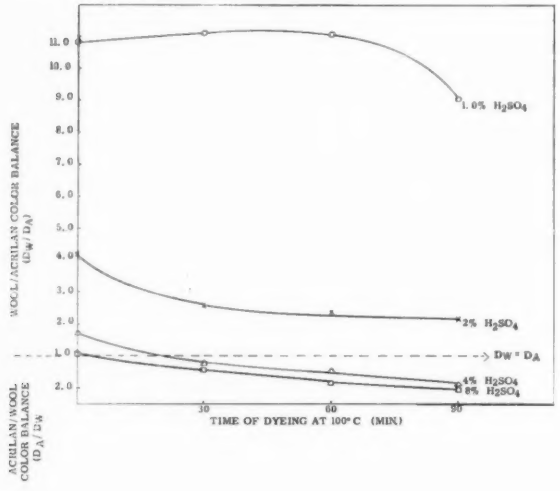


Figure 7
Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance
0.5% Fast Scarlet BA, 0.75% A-203

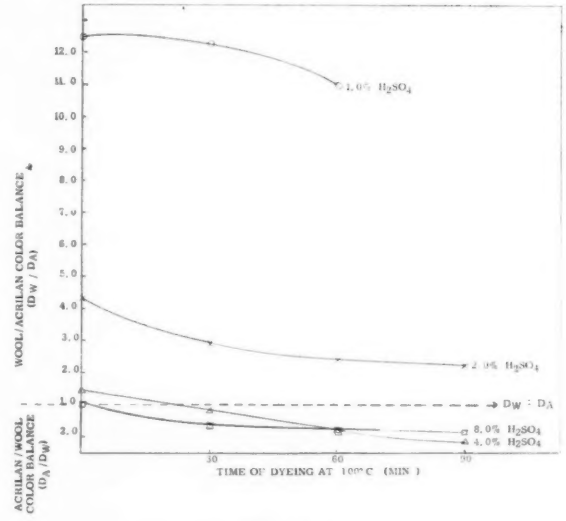


Figure 8
Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance
0.5% Fast Scarlet BA, 1.5% A-203

been removed. They were treated for two hours at the boil.

Consideration of the fibers treated with the nonionic and sulfuric acid shows desorption of the acid dyestuff from 0.60-0.48% and a sorption of the Acrilan from 0-0.05%. When the Chem-acril was added, however, the desorption of the wool was decreased from 0.6-0.475% and the Acrilan sorbed dyestuff from 0-0.2%.

Experiments were designed to show the effect of sulfuric acid and Chem-acril concentrations in union dyeing.

Figure 6 shows that, in the absence of Chem-acril, even the highest quantity of sulfuric acid does not give a union (represented by the dotted line) although it is shown that 8% of sulfuric acid is more effective than the lower quantities.

The Acrilan-wool color balance is defined as D_W/D_A where D_W and D_A are the amounts of dye on wool and Acrilan respectively as determined spectrophotometrically after extraction of the dyed fibers with a 40:60 pyridine:water mixture.

Figure 7 shows that the addition of 0.75% of Chem-acril yields a union with 4% of sulfuric acid in less than 30 minutes, and for longer dyeing times the result is a 2-1 overbalance in favor of the Acrilan; 8% of sulfuric acid, which failed to give a union without Chem-acril as shown in Figure 6, yields a union immediately upon reaching the boil.

Figures 8 and 9 show that, with the addition of higher quantities of Chem-acril, the results are similar to those shown in Figure 7.

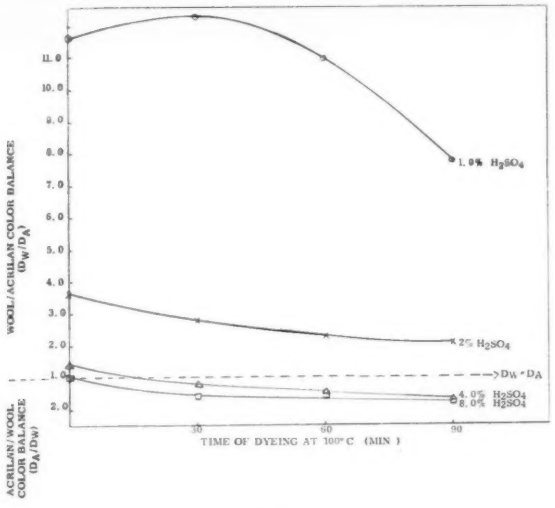


Figure 9

Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance

0.5% Fast Scarlet BA, 3.0% A-203

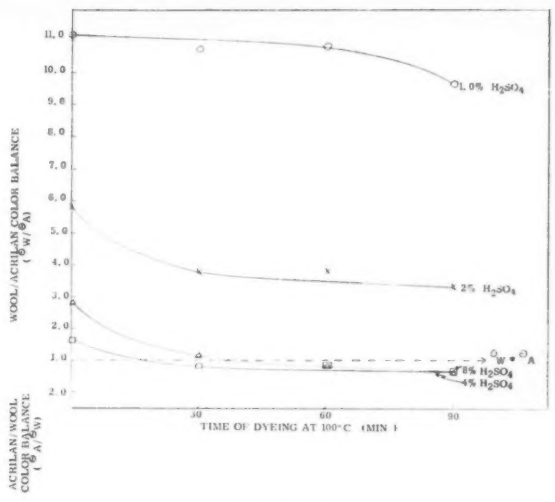


Figure 10

Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance

0.5% Fast Scarlet BA, 0.75% A-203

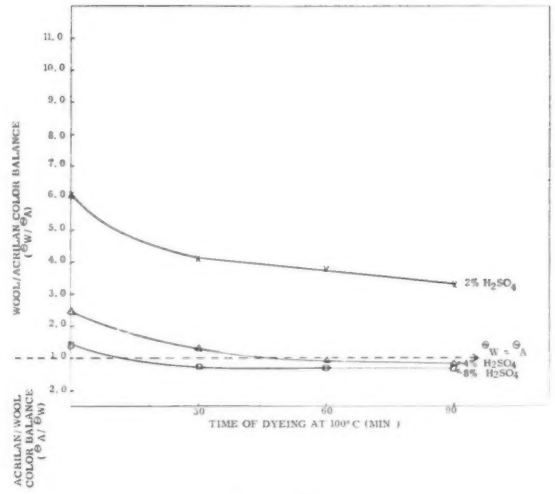


Figure 11

Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance

0.5% Fast Scarlet BA, 1.5% A-203

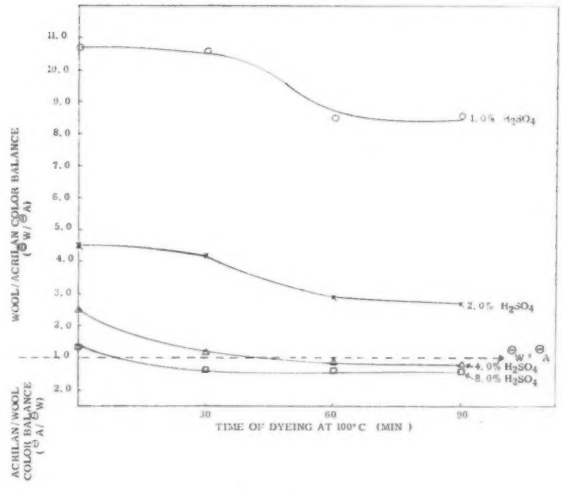


Figure 12

Effect of H_2SO_4 and A-203 concentrations and time of dyeing on wool-Acrilan color balance

0.5% Fast Scarlet BA, 3.0% A-203

Figures 10, 11 and 12 show data on Chem-acril additions measured by reflectance and which closely corroborate the data shown is Figures 7, 8, and 9.

In these graphs, the Acrilan-wool color balance is expressed as θ_W/θ_A where θ is the Kubelka-Munk function $\frac{(1-R)^2}{2R}$. R is the percent reflectance.

CONCLUSIONS

The conclusions to be reached from this work are as follows:

1) The Chem-acril dyeing assistant slows down the dyeing rate of wool under conditions of pH suitable to Acrilan, to a rate closely similar to that of Acrilan.

2) The Chem-acril dyeing assistant promotes a transfer or leveling between Acrilan and wool.

3) The use of Chem-acril dyeing assistant reduces the quantity of acid previously needed to effect unions.

4) A sulfuric acid-time relationship exists in which, within certain bounds, a reduced amount of sulfuric acid can be compensated for by longer time and vice versa.

The examination and evaluation of a large number of dyestuffs by these methods reveals the information that the quantities of sulfuric acid to be used vary with the dyestuff type. Figure 13 shows typical examples of neutral-dyeing premetalized, chrome, acid-metalized and strong-acid types. All the dyeings show excellent penetration with the specific quantities of acid used.

It is recommended that, in commercial practice, the prepared goods be circulated at 140°F in 0.75% of Chem-acril, 1.5% of an auxiliary such

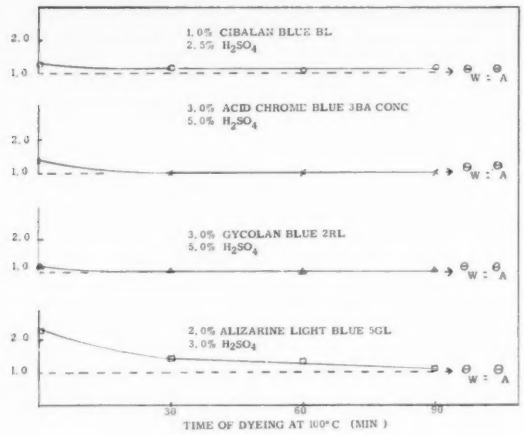


Figure 13
Union dyeing of wool-Acrilan with selected wool dyes

as Triton X-67, the requisite amount of dyestuff and the sulfuric acid appropriate to the dyestuff type. The temperature is raised to the boil over 45 minutes and dyeing is carried out for one hour. Additions of dyestuff for shading purposes are made by reducing the temperature of the dyebath to 190°F. Sulfuric acid addition may be safely used to promote transfer from wool to Acrilan if the union is not complete within the prescribed dyeing time.

A full shade range is available for both men's and women's wear with the wetfastness of the Acrilan component showing superiority over that of the wool.

Several hundred pieces have been dyed by this method with every indication that the theoretical findings have been reduced to regular commercial practice.

ACKNOWLEDGMENT

Acknowledgment is made to W C Carter for his work in the preparation of the data contained in this report.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

57-17

Education: textile engineering & chemistry, Hogere Textile School Tilburg; Business Administration School, Berlitz School of Languages.
Experience: approx 10 years dyer-finisher; laboratory; chemical sales; fibers and yarn sales (especially acrylic fibers); marketing; merchandising; sales promotion; trouble shooting.
Age: 38; married; references.
Position desired: sales; sales development of intermediaries: textile chemicals, dyestuffs, synthetic fibers and yarns (cotton, woolen, worsted, rayon, etc).
Location desired: South or Southeast. New York-New Jersey or California acceptable.

12-2; 12-16

57-19

Education: certificate, textile chemistry and dyeing, Lowell Technological Institute; industrial supervision, Univ of New Hampshire.
Experience: 20 years wool and synthetics dyeing.
Age: 44; married; references.
Position desired: dyer or demonstrator.
Present occupation: overseer of dyeing.
Location desired: New England.

12-2; 12-16

57-20

Education: BS, chemical engineering, Univ of New Hampshire.
Experience: 8 years research chemist and laboratory director.
Age: 30; married; references.
Present occupation: laboratory director.
Position desired: plant or research chemist.
Location desired: New England.

12-2; 12-16

57-24

Education: BS, chemistry, Ursinus College.
Experience: 3 years textile consultant; 15 years superintendent dyeing and finishing; 10 years chemist and dyer.
Age: 49; married; references.
Position desired: superintendent dyeing and finishing, or dyer.
Location desired: open.

12-2; 12-16

57-22

Education: BA, economics, Franklin & Marshall; textiles, Columbia Univ.
Experience: 9 years management trainee—dyer; 2 years technician—dyestuff manufacturer; 3 years assistant superintendent of dyeing; 1 year technical director—dye plant; 1 year manager—dye plant—Mexico.
Age: 42; married; references; veteran.
Position desired: Plant manager or assistant; plant superintendent or superintendent of dyeing.
Location desired: South or Latin America—any acceptable.

12-2; 12-16

57-23

Education: BTC (textile chemistry), Lowell Technological Institute.
Experience: 8 years plant chemist and trouble shooter in commission dyeing and finishing plants—rayons, nylon, modern synthetics; 1 year assistant manager; 1 year quality control engineer.
Age: 42; married; references.
Present occupation: quality control engineer.
Position desired: plant chemist, superintendent, assistant plant manager, or technical service.
Location desired: Metropolitan New York. New England acceptable.

12-2; 12-16

Membership Applications

November 6, 1957

SENIOR

Philip J Cohen—Partner & manager, Reliable Piece Dye Works, New York, NY. Sponsors: R E Miller, T M Rose. (NY).

H J Dix—Assistant foreman, Finishing Dept, Union Bleachery, Greenville, SC. Sponsors: L W England, E G Jones. (P).

Thomas P Hanley—Chemist, Warwick Chemical Co, Div of Sun Chemical Corp, Rock Hill, SC. Sponsors: E T McIllwain, R G Perriello. (P).

Lucille A Hunt—Chairman, Home Economics Dept, Santa Barbara College, Univ of California, Goleta, Calif. Sponsors: E Meshke, C L Lindsey. (PS).

John D Kilgore—Chemist, Union Bleachery, Greenville, SC. Sponsors: E G Jones, J K Brown. (P).

E Michael McMahon—Sales representative, Becco Chemical Div, Food Machinery & Chemical Corp, Philadelphia, Pa. Sponsors: M A Noonan, T H Hart. (DV).

G M Mitchell—Technician, General Aniline & Film Corp, Providence, RI. Sponsors: H Weidman, E Collins. (RI).

Bohuslav Morch—General manager, Galway Printers Ltd, Galway, Ireland. Sponsors: L Balassa, R Geering.

Henry Peper, Jr—Senior research chemist, Lever Bros Co, Edgewater, NJ. Sponsors: C W Dorn, E Artim. (NY).

Franklin R Schaeffer—Dyer & finisher, Wonder Knit Corp, Galex, Va. Sponsors: J Foster, Jr, R Link, Jr (P).

Charles R Sheehan—Textile chemist, The Dow Chemical Co, Warwick, Va. Sponsors: P A Gruber, H Rawath Walker, Jr. (P).

ASSOCIATE

William S Stevens—Staff engineer, Petroleum Chemicals Dept, Socony Mobil Oil Co, Inc, New York, NY. (NY).

A Warren Gray—Sales representative, B F Goodrich Chemical Co, Atlanta, Ga. (S).

JUNIOR

Robert L Sell—Second hand, Orr Felt & Blanket Co, Piqua, O. Sponsors: C E Worley, J Nerl. (MW).

Arthur Sirkin—Assistant manager, Glenwood Finishing Co, Sterling, Conn. Sponsors: W Boler, Jr, K Crowley. (WNE).

STUDENT

Nick Christodoulakis — Student, Philadelphia Textile Institute, Philadelphia, Pa. Sponsor: W H Hughes. (PTI).

Joseph Connolly, Jr, James M Hester, Thomas G Hollis, Leonard D Jones, Thomas E Lair, Huey E McCoy, John D Peak, Joseph C Penick, Paul T Price, Chung Sun Suh, and **James F Tinney**—Students, Georgia Institute of Technology, Atlanta, Ga. Sponsor: W Postman. (GIT).

Joseph McCusker — Rhode Island School of Design, Providence, RI. Sponsor: H B Sturtevant. (RISD).

Marjie G Scott—Student & graduate assistant, Pennsylvania State Univ. Sponsor: M P Shelton. (DV).

TRANSFER TO SENIOR

Jessie A Warden—Head, Clothing, Textiles and Merchandising Dept, College of Home Economics, Oklahoma State Univ, Stillwater, Okla. Sponsors: J Werden, R L Galbraith.

November 15, 1957

SENIOR

Joseph E Bresnahan — Standards manager, John P King Mfg Co, Augusta, Ga. Sponsors: J L Taylor, W Postman. (P).

Carroll F Chandler—Group supervisor, Process Section, E I du Pont de Nemours & Co, Inc, Waynesboro, Va. Sponsors: R C Blume, D W Snyder. (W).

Kwang Jun Choi—Textile consultant, Samho Textile Co, Ltd, Seoul & Taegu, Korea. Sponsors: R E Morrison, J K Frederick.

Joseph D Hixon—Superintendent, dyeing & bleaching, Charles H Bacon Co, Lenoir City, Tenn. Sponsors: W O Neeb, P O Anderson. (S).

Lewis W Lanterman—Dyer, Magee Carpet Co, Bloomsburg, Pa. Sponsors: A Malick, H M Friedman. (DV).

Stephen B Sello—Lab chemist, Texstyle Corp, Clifton, NJ. Sponsors: C Minoff, S Monroe. (NY).

William T Sheppard—Superintendent of dyeing, Pine State Knitwear Co, Mt Airy, NC. Sponsors: J B Foster, Jr, R A Link, Jr. (P).

Charles E Sherman — Technician, Manhattan Shirt Co, New York, NY. Sponsors: H B Martin, W S Woodson, Jr. (NY).

Saul Tessler—Textile chemist, Texstyle Corp, Clifton, NJ. Sponsors: C Minoff, S Monroe. (NY).

Robert C Oakley — Foreman, Bleachery-Finishing Dept, Fieldcrest Mills, Inc, Spray, NC. Sponsors: J W Arnell, Jr, H T Young. (P).

Fred R Tripp—Dyeing & finishing instructor, New Bedford Institute of Technology, New Bedford, Mass. Sponsors: E J Dupre, J C Broadmeadow. (RI).

A Edwin Wells—Executive secretary, Lowell Technological Institute Alumni Association, Lowell, Mass. Sponsors: G P Paine, G M Kidder. (NNE).

ASSOCIATE

Harold L Rieg—Director, dyestuff sales & branch operations, National Aniline Div, Allied Chemical & Dye Corp, New York, NY. (NY).

JUNIOR

Antonio N Aleixo, Jr—Research chemist, Warwick Chemical Co, Div of Sun Chemical Corp, Wood River Jct, RI. (RI).

STUDENT

Charles E Bailey, Joseph E Dyess, Raymond F Harrison, James E Luker, and **Marion W Robinson**—Students, Alabama Polytechnic Institute, Auburn, Ala. Sponsor: J H Cox. (API).

Kathryn N Connors, Robert H Davis, Cynthia L Dong, Robert J Lippe, and **John J Swistak**—Students, Lowell Technological Institute, Lowell, Mass. Sponsor: G R Griffin. (LTI).

Arthur W Davis Jr and **Bennie H Peters**—Students, Georgia Institute of Technology, Atlanta, Ga. Sponsor: W Postman. (GIT).

TRANSFER TO SENIOR

Duncan D Carmichael—Head of lab testing, Abbeville Mills Corp, Deering, Milliken. Sponsors: J M Straley, D G Carmichael. (P).

ACTIVITIES OF THE LOCAL SECTIONS

Western New England

GUEST speaker at the Western New England Section's Annual Meeting, held November 1st at Cavey's Restaurant, Manchester, Conn, was V Lindsay Chase, research assistant to the vice president, Interchemical Corp. Mr Chase gave many illustrations of the use of color and its characteristics in practical applications, after which the film, "This is Color," was shown.

The following were elected to serve the Section as officers for the coming year:

Chairman—John J Cervini, Cheney Bros

Vice chairman—Andrew W Goodwin, Princeton Knitting Mills, Inc

Secretary—Timothy J Horan, Princeton Knitting Mills, Inc

Treasurer—Peter P DuBiel, Cheney Bros

Councilors—J Edward Lynn, consultant, and John E Hirn, Sr, National Aniline Div, Allied Chemical & Dye Corp

Named to the Sectional Committee were: Albert H Rant, Laurel Soap Mfg Co; Ernest Otto, Lee Hat Co; Paul W Reeves, Princeton Knitting Mills, Inc; and John E Hirn, Jr, National Aniline Div, Allied Chemical & Dye Corp.

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Niagara Frontier

THE Niagara Frontier Section, AATCC, and the Ontario Section, Canadian Association of Textile Colourists and Chemists, met jointly in the Elizabeth Room of the Queensway Hotel, St Catherines, Ont, October 25, 1957, with more than 100 members and guests in attendance. W H Leyking, Niagara Frontier Section chairman, opened the business session with a greeting of welcome and thanks for the impressive turnout.

K A Lister introduced the speaker of the evening, Maurice R Fox of Imperial Chemical Industries Ltd, who discussed "Reactive Dyestuffs in the Dyeing of Cellulose Materials." The talk, illustrated with slides, covered the latest developments in both "hot" and "cold" dyeing with the new Procion dyes. The theory behind the reactivity of these dyestuffs with cellulose and their application in batch, semicontinuous and continuous processes was discussed in detail.

Delaware Valley

AT the November 1st meeting of the Delaware Valley Section, held at Kugler's Restaurant, Philadelphia, Pa, William J Wygand, Technical Laboratory, Organic Chemicals Dept, E I du Pont de Nemours & Co, Inc, spoke on "Recent Developments in Carpet Dyeing."

The paper covered developments in the dyeing of rawstock, yarn and piece goods. Continuous rawstock dyeing, package dyeing and continuous pad steam procedures were discussed. Union dyeing methods for nylon/wool blends and shade formulations for carpet shades were given. Particular emphasis was placed on the neutral-dyeing premetalized dyes and their use in carpet dyeing.

AATCC Calendar

COUNCIL

Jan 24 (Hotel Statler, New York, NY); May 23 (Philadelphia, Pa); Sept 19, 1958 (Charlotte, NC)

NATIONAL CONVENTIONS

Oct 30-Nov 1, 1958 (Hotel Conrad Hilton, Chicago); Oct 8-10, 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY)

HUDSON-MOHAWK SECTION

Jan 24 (Albany, NY); Mar 28 (Johnstown, NY area); May 16 (Ladies Night); June 20 (Summer outing)

MID-WEST SECTION

Feb 15 (Hotel Bismarck, Chicago, Ill); April 19 (Netherland Hilton Hotel, Cincinnati, O); June 13-14 (Outing—Browns Lake Resort, Burlington, Wis)

NEW YORK SECTION

Feb 7 (New York, NY); April 11 (New Jersey area)

NIAGARA FRONTIER SECTION

Feb 21 (Buffalo); Apr 4 (Joint meeting)

PIEDMONT SECTION

Jan 24-25 (Clemson House, Clemson, SC); Apr 11-12 (Washington Duke Hotel, Durham, NC); June 6-8 (Outing—Grove Park Inn, Asheville, NC); Sept 19-20 (Hotel Charlotte, Charlotte, NC)

Hudson-Mohawk

THE Hudson-Mohawk Section met November 22, 1957 at the Johnstown Hotel, Johnstown, N Y with Chairman Edward A Chevrette presiding.

Dinner was served to sixty-one members and guests, following which Maurice Fishman, vice chairman, introduced George O Linberg, AATCC president; George P Paine, AATCC executive secretary and Charles A Sylvester, chairman, Technical Committee on Research. The three officials presented a picture of the Association's operations, including the reorganized National Headquarters setup, and the research and technical activities, and discussed means by which members, the Section and the Association can mutually benefit.

In addition to the above speakers, Charles W Dorn, head of the Executive Committee on Research, presented his talk "Operation Cue." This subject dealt with the exposure of various materials to atomic disintegration and covered the work that was done at the Atomic Proving Grounds in Nevada.

◆ ◆

Pacific Southwest

THE Annual Outing of the Pacific Southwest Section was held at Ojai Valley (Calif) Country Club, October 25-27, with 64 members and guests in attendance.

J Raymond Nehmens, E I du Pont de Nemours & Co, Inc, served as outing chairman.

Golf chairman John Smith awarded prizes to the following event winners: Low gross—Angus H Roberts, Jacques Wolf & Co; Blind bogey—Harold W Ellsworth, West Coast Carpet Dyers; High gross—J R Nehmens.

Western Carloading Co sponsored a cocktail party on Saturday afternoon, which preceded the Saturday night banquet, at which door prizes were awarded.

* * *

Harold W Ellsworth, West Coast Carpet Dyers, formerly vice chairman, has succeeded Melville H Behrendt as chairman of the Pacific Southwest Section. Mr Behrendt, formerly with Catalina, Inc, has taken a new position with Renart Sportswear in New York.

HEAD TABLE—FALL 1957 MEETING OF MID-WEST SECTION—*Seated (l to r):* Jack G Kelley, E I du Pont de Nemours & Co, Inc, acting chairman; George O Linberg, president, AATCC; Charles W Dorn, chairman, AATCC Executive Committee on Research; Kenneth M Harms, Morgan Dyeing & Bleaching Co, treasurer. *Standing (l to r):* Warren B Broadbent, Geigy Dyestuffs, secretary; Elliott Morrill, The Best Foods, Inc, AATCC vice president; George P Paine, AATCC executive secretary.

MID-WEST SECTION OFFICIALS—*Seated (l to r):* Walter H Sites, Ciba Co, Inc, secretary-elect; Jack G Kelley, Du Pont, chairman-elect; James L McGowan, Morgan Dyeing & Bleaching Co, vice chairman-elect; Frank H Gurry, Aurora Bleachery, Inc, treasurer-elect. *Standing:* Kenneth M Harms, Morgan Dyeing & Bleaching Co, treasurer; Warren B Broadbent, Geigy Dyestuffs, secretary.

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AATCC OFFICERS AT 208TH COUNCIL MEETING—Officers of AATCC are shown at Lowell Technological Institute during the time of the 208th meeting of the Council last month. L to r: George P Paine, executive secretary; Weldon G Helmus, vice president; Elliott Morrill, vice president; George O Linberg, president; H Gillespie Smith, vice president; and Charles W Dorn, chairman, Executive Committee on Research.

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Impregnation for Water Repellency———

(Concluded from page 952)

WB (Sandoz), Velan PF (ICI), and Zelan (DuPont).

A characteristic of these water-repellent impregnants is their softening effect, which is more often considered an advantage than a disadvantage. Good washfastness is also a pronounced property. When goods are padded and dried with such products, condensation takes place and, as pyridine splits off, unpleasant odors are evolved. Subsequent washing is therefore necessary, which also removes any acids that may have formed.

These products may be used in combination with synthetic-resin precondensates. This method also necessitates subsequent washing and condensation.

The products known under the Phobol tradename (Chem Fabrik Pfersee), which are based on similar compounds, are preferably employed in combination with emulsions of water-repellent impregnating agents containing metal salts. In this case, however, subsequent washing is not required.

TYPE No 5———Structurally, silicones are among the most interesting materials used for water-repellent impregnation. In contrast to the products discussed so far, the silicones do not contain long-chain aliphatic radicals. Instead, their hydrophobic effect —according to a simplified explanation—is due to a high degree of polymerization of the layer surrounding the fiber.

Good washfastness and excellent resistance to drycleaning may be regarded as advantages of the silicones, whereas the soft, soapy handle they impart to the goods is pleasant but too flabby. The slip tendency of the goods, produced by the impregnation with silicones, can usually be more or less nullified by the addition of suitable nonslip agents, ie, small amounts of a thermosetting synthetic resin. The chemical industry for some time has been able to offer stabilized silicone emulsions, which are highly effective—particularly on synthetic fibers and wool—when used with special hardeners, usually metal salts. However, relatively high condensation temperatures are needed for obtaining the best possible effects, if one does not wish to rely on the subsequent setting of the resin during prolonged storage. At the moment it seems that water-repellent impregnation with silicones, which has the advantage of simple preparation of the impregnating liquor, is also gaining ground in Germany. Besides the trademarked silicones known in the past, the newly developed P-Silicon emulsions of the Chem Fabrik Pfersee have become domestically available. Silicones are fundamentally suitable for use in combination with thermosetting synthetic resins and, under the proper conditions, give excellent results when applied in this manner. Abroad, for instance in France and England and especially in the United States, this process is already finding wide and successful application.

TYPE No 6———In our closing remarks about the members of the family of water-repellent impregnating agents, we wish to mention briefly the relatively new group of stearatochromic chloride products. For instance, Hydrophobol L 1300 (Pfersee), Ombrophob C (Sandoz), Phobotex CR (Ciba), and Quilon (DuPont) belong to this group. The impregnating substance, dissolved in organic solvents, hydrolyzes in aqueous solutions on the treated textile material. Products of this type are particularly effective in the case of Perlon or nylon, as well as acetate. Another advantageous property of these impregnants is their slight tendency to produce surface coatings, as a result of which they are especially suitable for the water-repellent impregnation of color-sensitive, easily marked synthetics. In addition, the extraordinary fastness to washing and to drycleaning of Perlon or nylon, respectively, is worth stressing. This remarkable attribute can be explained by the fact that the outer electrons of a chrome atom are probably capable of penetrating into the synthetic material, eg, Perlon, and of forming a complex with a nitrogen atom of the material. However, the greenish color due to the combined chromium atoms of these products is a certain disadvantage, which must be taken into account in the treatment of material dyed white or in light pastel tones.

On the whole, one may predict that this class of products will be used successfully, at least for obtaining water repellency in synthetic materials and suitable mixed-fiber fabrics.

NOTE: The following trademarks are registered in Germany and internationally: Knittex, Impraegnol, Phobol, Hydrophobol.

Abstracts

New Knowledge Concerning the Functional Properties of Formaldehyde in Cotton and Rayon Finishing

Hall, A J, *Textile Recorder* **74**, 68-9, March, 1957

The increasing use of formaldehyde and synthetic resins derived from formaldehyde and urea or melamine for the finishing of cellulose fiber materials, hitherto mainly for conferring crease resistance and dimensional stability but more recently also for giving the special type of stability required in so-called "wash and wear" and "easy-on-ironing" fabrics and garments, makes it more than ever necessary that the manner in which formaldehyde functions during such finishing should be more clearly elucidated.

In general, earlier researches have indicated that when formaldehyde is reacted with a cellulose fiber under acid conditions, pairs of adjacent hydroxyl groups enter into reaction with a molecule of formaldehyde, thereby forming a methylene ether bridge or cross-link.

This cross-linking of adjacent cellulose molecules generally has the effect of consolidating the structure of a cotton or viscose rayon fiber and of making it less sensitive to swelling when wetted. Wet fiber swelling plays an important part in the shrinkage which textile materials suffer when repeatedly washed, and thus a formaldehyde treatment of cellulose fiber fabrics under conditions designed to give the utmost cross-linking of the cellulose molecules is now the most favored method for producing shrink-resistant cotton and rayon fabrics. A formaldehyde treatment is more effective than a resin treatment for this particular purpose, according to the author.

The reaction of formaldehyde with cotton, viscose rayon, and Fortisan (completely saponified and highly stretched acetate), respectively, has been investigated. It was found that pH 2 and temperatures of 110° to 130° C, the rate of reaction was slower with cotton, which is a highly crystalline fiber (about 30% anhydrous) and

orientated. Viscose rayon, which is less crystalline (about 60% amorphous) and very little orientated, has a considerably higher rate of reaction, while Fortisan, also less crystalline (about 60% amorphous) but highly orientated, has the highest rate. It is concluded that the formalization process at pH 2 consists of an immediate rapid reaction in the amorphous regions and a slow diffusion of formaldehyde into the crystalline regions; and at higher pH values there is no appreciable formalization of the crystalline regions.

Cotton treated with formaldehyde shows a greater deterioration in mechanical properties (eg, tensile strength) than Fortisan and viscose, but the improvement in crease resistance is greatest for cotton, less for Fortisan, and least for viscose rayon. —WHC

Dyeing Terylene Stockings

Davies, D J, *Dyer* **117**, 681, April 26, 1957

The stockings are first scoured at the boil with a cationic detergent and washed thoroughly.

Terylene filament yarn can be dyed in light to medium shades with disperse dyes of small molecular size without the aid of a carrier. Suitable dyes (all British) are recommended by the author. The dyebath contains, in addition, soap flakes and both cationic and nonionic detergents. The stockings are dyed in this bath for 1½ hours at the boil.

Dark shades, especially blacks, require a more complex process. A black can be produced with a combination of three disperse dyes (yellow, violet and blue), or the modified azoic process may be used, in which a developed black disperse dye is applied to the stockings at the boil with the addition of a suitable coupling agent, and the dye is then simultaneously diazotized and coupled by treatment with sodium nitrite and hydrochloric acid, starting cold and gradually heating to 85°C.

The author also suggests suitable methods for stripping the dyes from the fiber when necessary.—WHC

Arnel Tricot Antistat

Anon, *Modern Textiles* **38**, 42, August, 1957

A permanent antistatic finish has been developed for Arnel triacetate fabrics by Celanese Corp of America, according to an announcement by that firm. The process, as described by Reiner G Stoll, laboratory director, creates a skin of cotton-like cellulose around each Arnel filament. This skin constitutes about 2 percent of the total fiber, and forms an integral part of the fiber, not removed by washing or wearing.

Since the electrification of fibers is a surface effect, the hydrophilic (water absorptive) cellulose surface of Arnel treated by this process has anti-static properties similar to those of cotton.

The treatment consists in subjecting the tricot for ½ hour to a solution of caustic soda (0.3-0.7%) at 205°F, with addition of Triton X-100 and Igepon T Gel. The fabric is then washed and neutralized and is ready for dyeing.

The author explains that the new process is applicable only to Arnel. In addition to its antistatic property, it is said to give the fabric increased resistance to atmospheric fading and wet and dry crocking and a softer hand.

Full details of the process are given by the author, who states that virtually all Arnel tricot reaching the market is now subjected to this treatment.—WHC

How to Pad-Dye Polyamide and Polyester Fibers

Wuerz, A, *Textile World* **109**, 95, October, 1957

Low-temperature pad dyeing is possible on polyamide-fiber fabrics by methods recently developed in Europe. The process is based on a water-in-oil emulsion carrying Vialon (premetallized) dyes in solution in the water phase of the emulsion.

The advantages of the system include:

1) The possibility of padding at a temperature of 35°C.

2) No trouble with dye separation, because the viscosity of the emulsion keeps it homogeneous.

3) The dye does not migrate on the fabric.

4) Rapid diffusion of the dye in the fabric, because the hydrocarbon continuous phase lowers the surface tension of the fabric.

The emulsifying agent used (Lumulson F), diluted wtih water, is put under a high-speed mixer, and the dissolved dye is stirred in at 35°C. The mixture is diluted with turpentine substitute.

After padding with the emulsion at 35°C the fabric is dried in a flue dryer or by infrared radiation. It is then steamed at 30 lbs pressure for 20 minutes. As an alternate method, the dyed and dried goods may be treated on a jig with boiling water at pH 5 for 30 minutes. It is also possible to develop and fix the color by heat treatment similar to that used for dimensional stability.

Full details for carrying out these various operations are furnished by the author.

Polyester fibers are dyed by the use of a somewhat similar emulsion, but using disperse dyes (Celliton) instead of premetallized. After padding and drying, the fabric is passed through a heat-setting tenter at 215-220°C. Unfixed color is then removed by a hydrosulfite treatment.

Advantages claimed for this new method of dyeing include reduced processing time and freedom from warp streaks.—WHC

Vat Dye Printing Without Starch

Anon, *Modern Textiles* **38**, 50, June, 1957

In vat color printing, the required viscosity of the printing paste is usually obtained by the use of a combination of starch and British gum. After printing and ageing, the fabric is treated in an oxidizing bath in order to convert the leuco vat dye to the oxidized form. It is then scoured in a hot detergent bath to remove the chemicals and thickening agents deposited during printing, and to develop the true shade and fastness of the vat dye.

Removal of the starchy ingredients of the printing paste from the fabric during the normal scouring operation is difficult, and complete removal of the starch can only be accomplished by costly and time-consuming re-scouring or desizing.

The presence of starch in the completely processed vat dye printed fabric is objectionable from the standpoint of the stiffness which it imparts to the fabric, and because it interferes with the application of resin finishes to the printed goods.

The American Cyanamid Co. has introduced a method for printing vat dyes from an oil-in-water emulsion which eliminates the troublesome starch and is said to have other advantages. In the new process, a low-cost hydrocarbon solvent is emulsified into a water solution of an emulsifying agent (sodium lignin sulfonate), an emulsion stabilizer (carboxymethylcellulose or other soluble gums), alkaline carbonate, sodium formaldehyde sulfoxylate, and a humectant (sucrose). The vat dye paste is incorporated in this emulsion by hand or mechanical stirring. The viscosity of the paste is regulated by a variation of the water/solvent ratio.

Since all of the components of the emulsion are cold water soluble, no heating is involved in its preparation.

Both application and resist printing, and also white and colored discharges, are possible with the emulsion system, which may also be used for screen printing.

Among the advantages claimed for the new process are low cost, brighter and stronger prints, and complete removal of the ingredients of the paste

in open soaping. Several advantages are also noted in screen printing. —WHC

Fabrics Treated with Dimethylol Ethylene Urea

Walter, H C, Buxbaum, J K, and Green, L Q, Dyer **118**, 333-4, August 30, 1957.

Probably the most significant development in the finishing of textiles in the post-war era has been the chemical modification of cotton to give greatly improved resilience and dimensional stabilization. By combining the chemical treatments with calendering, the finishing industry has also achieved durable surface glazes and embossed effects on cotton. One of the most effective chemical compositions used in producing these modifications is dimethylol ethylene urea (DMEU).

According to the authors, finishes produced on cotton with DMEU are noted for their crease-resistant properties, minimum chlorine retention, lack of surface resin formation, and durability when subjected to extended laundering in detergent solutions. This combination of properties makes DMEU particularly suitable for "wash and wear" finishes, which do not differ fundamentally from ordinary crease-resistant finishes. However, higher concentrations of the resin are generally employed for "wash-and-wear" fabrics.

DMEU is applied to cotton fabrics by the conventional pad-dry-cure process. An acid catalyst (eg, tartaric acid) is required; latent acid catalysts may also be used.

In addition to crease recovery and dimensional stability, the authors state that fixation of DMEU on cellulose results in an increase on the modulus of elasticity, a lower degree of swelling in water, and insolubility in cuprammonium hydroxide solution. Staining studies with Tollens reagent have shown that DMEU, applied from water solution is deposited uniformly throughout the individual cellulosic fibers. There is no surface deposition.

The durability of the DMEU finish can be explained only by a chemical interaction of the resin and the fiber. It is believed that the chemical linkages of DMEU to cellulose, probably methylol ethers, are formed in such a manner that cross-linking of cellulosic chains occurs, and that this cross-linking is responsible for the improved mechanical properties of cellulose when so treated.—WHC

Zefran

Stanton, G W, *Textile Research J* **27**, 703-12, Sept. 1957.

Zefran, the new fiber produced by Dow Chemical Co, is classified by the author as a "nitrile alloy" fiber, to distinguish it from acrylonitrile copolymer fibers, which are usually referred to as "acrylics".

The author explains the new fiber's alloy structure, which is stated to be "essentially a continuous hydrophobic polyacrylonitrile backbone, containing discrete volumes of a hydrophilic dye-receptive polymer."

Compared with acrylonitrile copolymers, Zefran has a much higher moisture regain, a higher sticking temperature and a better dyeability, particularly with vat, Naphthol and sulfur dyes.

Zefran as normally sold is a crimped fiber. The crimp in Zefran is worth special mention in that it is permanent to boiling water. Crimp is essential for good processing on conventional textile equipment and imparts softness and resilience to the finished fabric.

The high moisture regain controls static to some extent, especially at higher humidities, and also imparts added comfort when the fiber is worn next to the skin.

One feature of the Zefran fabric is its ability to retain a crease, even after washing with soap at 120°F.

Regarding the action of chemicals, the fiber is stable to acids (up to 40 percent concentration); it turns yellow with alkalis at the boil, but is unaffected by mercerizing liquids; it has excellent resistance to drycleaning solvents.

For dyeing, the neutral premetallized acid dyes and aftertreated direct dyes are particularly recommended for beck work and knit goods. Excellent dyeings on Zefran/cotton blends are obtained with anthraquinone vat dyes and Naphthols. Heavy shades are obtained with sulfur dyes. On blends of Zefran and wool, solid colors and cross-dyeings are produced with premetallized dyes.

Zefran fabrics may also be printed with vats, soluble vats, and Rapidogens by conventional techniques.

Some of the suggested uses for the new fiber are in men's, women's, and children's clothing, in both knitted and woven fabrics, made from 100% Zefran and blends with cotton, rayon, and wool.—WHC

Wool and Man-mades Go Well Together

Goldberg, J B, *Modern Textiles* **38**, 42, 44, 71, October, 1957.

The author, in discussing blends of wool and rayon, states that any attempts to convince manufacturers and consumers that rayon is an inferior fiber and at best and adulterant are both "inaccurate and unrealistic". He suggests that American mills and consumers could benefit by making and using more wool/rayon blends. He refers to an English serge made of 30% black spun-dyed rayon and 70% wool, which is being accepted for use in clothing worn by police, firemen and postmen in that country. Also, in England, blankets containing high percentages of rayon have been in extensive commercial production for sometime, and are said to withstand laundering with less yellowing and shrinkage than all-wool blankets. Men's socks are being knitted of 50:50 wool/rayon, and the British army is using similar blends in underwear.

Nylon has been established as a fiber which contributes to blends exceptional resistance to abrasion and wear. The author states that for each one percent of nylon staple added to wool there is a three percent increase in yarn strength. He states that the use of nylon in wool hosiery is almost imperative if one wants to insure against premature wear in areas subjected to considerable rubbing, especially in the toe and heel. Heavy denier nylon staple added to wool in carpeting greatly increases the wear and crush resistance.

Vicara has been combined with wool to provide an extremely soft hand. Its relatively low price makes it particularly attractive.

Orlon is blends with 45% wool has been successful in women's wear woolens. These fabrics are washable with little shrinkage, and permanent pleats can be introduced. Knit goods with about 20% wool show minimum wrinkling is use, and attractive cross-dyed effects are possible.

Acrilan, with somewhat similar properties, has many of the same end-uses as Orlon. Both Acrilan and Orlon have less resistance to burning than wool, and for military apparel Dynel and Verel are preferred.

The author thinks it not improbable that the acrylic family of synthetics will some day supplant wool entirely in certain apparel fabrics. However, he believes that their partnership with wool in a much wider range of mens, women's and children's wear is likely to see further expansion within the next few years.

Dacron/wool blends found early acceptance in tropical suitings. The Dacron fiber has its limitations (eg, costly dyeing, pilling problems, and static), and has to rely on other fibers to make up for its weaknesses. Terylene, the British equivalent of Dacron, is said to be used extensively also in suitings of heavier weight.

The author believes that a greater effort should be made to explore the potential of man-made fibers in blends.—WHC

Effect of Laundering and Starching on the Serviceability of Cotton Shirts

Galloway, E M, Grimes, M A, and Hunt D M, Misc Publication 220, Texas Agric Expt Station.

Three methods of laundering are in common use: commercial, home methods with modern equipment, and the traditional "black pot" method which is still used in some areas, especially in the South.

Studies were conducted at Prairie View A & M College on the effectiveness of these three laundry methods in removing soil, and the effect of each method on the serviceability of cotton shirts.

Forty white broadcloth shirts were laundered 36 times by four methods: traditional black pot method of soak, rub, boil, rinse and dry outdoors; modern home method without starch; modern home method with starch; and in the Prairie View College commercial laundry without starch. Half of the shirts were worn one day between launderings; the other half were laundered but not worn.

The wearers thought the shirts laundered without starch did not look as well or stay fresh as long, but were more comfortable than starched shirts.

The effect of the various laundry methods on soil removal, color and strength of the shirts was determined by tests in the laboratory of the Texas Agricultural Experiment Station at College Station.

The black pot method was the most effective for removal of stains and soil, and the shirts washed by this method were the whitest, perhaps because of bleaching by sunlight while drying outdoors. Those laundered by the modern home method remained white throughout the study. The commercially laundered shirts soon became yellow and dingy and did not regain their whiteness.

Breaking strength tests indicated that commercial laundering caused much greater loss in strength in both the worn and unworn shirts than the other methods of laundering. The black pot method caused greater loss in strength than the modern home methods.

The authors furnish complete details of the different laundering operations and the loss is strength, in both warp and filling, resulting from each method employed.—WHC

Discoloration of Orlon Sweaters in Drycleaning

Bayley, C H and Tweedie, A S, *Can Textile J* **74**, 64, Sept 20, 1957

The authors report that they have seen dry-cleaned Orlon sweaters in pastel shades which showed discolorations, which did not appear to be just graying due to redeposition of soil. In some, the color appeared grayish; in others it appeared greenish, bluish, etc. Examination by microscope showed that this was not due to colored lint picked up and held by static charges (though this can be a nuisance with Orlon and other synthetic fibers which hold very little moisture). Tests made on two discolored yellow sweaters showed that the stain was not removed either by a clean solvent rinse or by washing with soap and water.

It was decided that most of the discoloration was due to pick-up of color during drycleaning.

Orlon, unlike nylon, is not very easy to dye, and only a limited number of dyes of a few types can be used successfully under ordinary dyeing procedures. It therefore seemed rather puzzling why it could become dyed so easily during drycleaning.

Pieces of Orlon sweater material were treated with solutions of various dyes dissolved in drycleaning solvent, including cationic and disperse dyes. The fabric was discolored in every case, but the stain was easily removed by rinsing in clear solvent or water.

It seems probable that the strongly held color which is picked up by Orlon sweaters during drycleaning is in the form of very fine particles of dyes and pigments which were only loosely held on the surface of other dyed fabrics, and which rubbed off them and became suspended in the cleaning solvent, and finally were attracted to and picked up by the Orlon fibers.

The authors were able to produce similar discolorations in the laboratory by using suspensions of fine insoluble dye particles in a solution of drycleaning solvent plus detergent. The nature of the particular dyes or pigments involved in any given case will determine how difficult it will be to remove the discoloration from the Orlon fabric.—WHC

Application of Sulfur Dyes

Senior, H, *Textile Mfr* **83**, 200-2, April, 1957.

The author outlines some of the many problems in connection with the application of sulfur dyes which merit attention.

Regarding sodium sulfide, he states that the crystals are to be preferred, particularly for package dyeing, as the calcined sulfide contains insoluble matter and is easily oxidized to sodium sulfate in storage.

In addition to sodium sulfide as the medium for dissolving and reducing sulfur dyes, there are in use several other methods which offer certain advantages in some cases. One method uses sodium hydrosulfide (NaHS) in place of sodium sulfide. The advantages claimed for this method are 1) a finely reduced state in the dyebath, a distinct asset in package dyeing; 2) the production of heavy shades without bronzing. In some cases the color value is also improved.

Another method employs caustic soda and sodium hydrosulfite, especially for dyeing sulfur blues. It is said to produce brighter shades, and in some cases an increased depth of shade.

Still another method consists of the addition of monosodium phosphate to the dyebath prepared as usual with sodium sulfide. This method is said to give better exhaustion of the bath, more complete reduction of the dye, better leveling and less danger of selvage oxidation. A disadvantage is the possible evolution of H_2S gas.

Regarding the dyeing of cops and cheeses, the author emphasizes that the bath must be free from insoluble matter, and recommends screening the dye liquor through cloth to remove coarse, gritty impurities.

After-treatment of the dyed material is desirable to obtain a fully oxidized shade. Sodium perborate and percarbonate are used for this purpose, particularly for blues. Used in too high concentrations, he warns, they have a bleaching effect. For oxidizing khakis and browns, bichromates are used extensively, but they have a dulling effect on some other shades, especially bright blues and greens.

After-treatment with copper sulfate increases the lightfastness of almost all sulfur dyes, but its use is limited, as it has a definite dulling effect, it imparts a harsh hand to the fiber, and it may not be employed if the material is to be vulcanized later.

The author also discusses briefly the application of sulfur dyes in printing. —WHC

The Industrial Chemistry, Properties, and Application of Silicones

Reed, C E, presented at the 59th Annual Meeting of ASTM. Thirtieth Edgar Marburg Lecture.

The silicones are a relatively new group of completely synthetic engineering materials which have developed through a union of the organometallic chemistry of the element silicon with the modern science of high-polymer chemistry. Through unusual properties deriving from their organometallic nature combined with the fundamental chemical bonding of silicon through oxygen to sili-

con, known as the siloxane bond, silicones have become the first group of commercially important polymers to combine many of the desirable properties of both organic and inorganic materials, in addition to many new and unique properties of their own, previously unavailable to industry.

Silicone chemistry has proven so versatile that today the silicone industry produces practically all forms of matter, including resins, varnishes, elastomers, fluids of all consistencies from water-thin through high viscous oils to gums, greases, pastes, putties, emulsions, and molding compounds.

The speaker reviewed the basic structural chemistry of the silicones, and showed how this chemistry explains the various properties of these products as a group of engineering materials, and how these properties lead to the most important applications of silicones in industry. His talk was illustrated by numerous diagrams showing the molecular structure of the various compounds. He also described the commercial manufacture of silicone oils and greases, starting from methylchlorosilanes, which in turn are made from silicon metal and methyl chloride.

Silicone fluids in common use are dimethyl silicones and copolymers of methyls and phenyls, and methylphenyls, as progressively more heat stability is required. Used as lubricants, these silicones are the only materials with sufficient stability to be operable over a range of almost 800°F (700° to —65°F). This has made them of particular interest to the aircraft and guided missile industries. In the electrical industry, their thermal stability permits operation of motors at elevated temperatures for extended periods of time without relubrication.

Silicone rubber gaskets remain flexible and shock-absorbent at very high and very low temperatures. Silicone rubber also has valuable properties for electrical insulation, eg, for wire and cable. The past ten years have seen the development of hundreds of different silicone - rubber compounds for a wide variety of uses.

One of the fastest growing applications of silicone products in the protective coatings industry is their use as water-repellents on masonry.

Textiles treated with properly formulated methyl silicone fluid emulsions are rendered water-repellent and resistant to water-borne stains. In wash-and-wear fabrics, silicone treatments reduce the dynamic water absorption of a fabric, thus accelerating drying times. At the same time they prevent the loss of tensile strength which frequently occurs when resin finishes are applied.

Other uses for silicones discussed by the author were as antifoam agents; as additives in automobile and furniture polishes; and in protective creams, lotions, and cosmetics.

Thirty-one references to the literature are cited.—WHC

• PATENT DIGEST •

PAUL WENGRAF

FLAMEPROOFING with Diammonium Phosphate———Adding Polyamine Compounds, Nitrogen Compounds and Certain Softeners G,2,03

USPat 2,784,159 (Am Cyanamid——Fluck, Moretti——March 5, 1957)

Diammonium phosphate is a well-known flame retardant in itself, but fabrics impregnated with it become stiff and boardy. Moreover, the compound decomposes on aging, leaving acidic residues that might impair the tensile strength.

The current invention tends to improve the effect of this agent and the quality and hand of the fabrics so treated by applying a composition containing:

a) a water-soluble salt of pentavalent phosphorus oxygen-containing acids,

b) a water-soluble polyalkylene polyamine,

c) a water-soluble specific nitrogen compound, and

d) a certain softening agent (described below).

a) Although diammonium phosphate is preferred, other phosphoric-acid-containing materials, such as alkali dihydrogen phosphates, guanidine phosphates, and various pyrophosphates, may be used as well.

b) The preferred compound is hexamethylene diamine; other products belonging to this group are triethylene tetramine and similar bases having a boiling point substantially above 200° C. These compounds particularly reduce discoloration of the fabrics.

c) Water-soluble nitrogenous compounds of this group include cyanamide, dicyandiamide, ammonium thiocyanate, urea, etc. The purpose of this addition is to prevent a loss of tensile strength, apparently by neutralizing any acidic decomposition products of the phosphates as soon as they are formed; also, some nitrogen may be furnished, increasing the flame-retardant effect of the phosphates.

d) The specific wetting and softening compounds are protected by USPat 2,427,242 (1947), assigned to the same Company. An example (#4 of the latter patent) refers to mixtures of higher aliphatic substituted guanidine salts with carbamates of higher alkylamines, such as a mixture of octadecyl guanidinium octadecyl carbamate and octadecylamine octadecylcarbamate reacted with 2-10 (5-7) mols of alkylene oxide. The dispersing and softening agent has the purpose mainly of solubilizing the flame-retardant composition, increasing its penetration, and generally improving the hand of the fabrics.

These compositions (a-d) may be padded on the fabrics at temperatures as low as 80° F by reason of their increased solubility, or spray-dried with 20% concentrated solutions at 90-120° F. They are believed to be pure physical mixtures, which do not chemically react with the fabrics (col 4, lines 50-56), and thus do not impart a washfast finish.

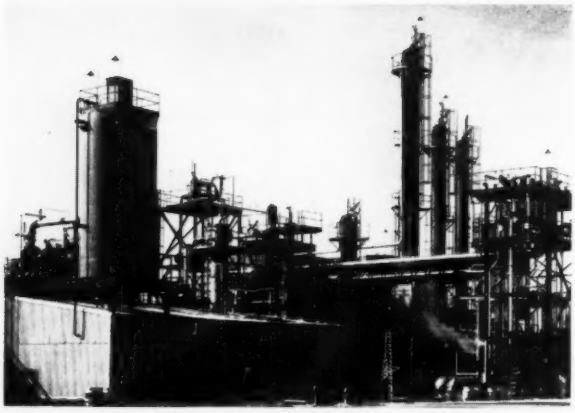
Example (from claim 2): the composition contains 100 p diammonium phosphate, 4-10 p hexamethylene tetramine, 10-50 p dicyandiamide and 0.4-0.5% of the softening product described under "d".

Among the references cited by the Patent Office:

USPat 2,452,054-55 (Albi Mfg Co/1948) describes flameproofing compositions containing ammonium phoshates and formaldehyde condensates.

USPat 2,632,743 (Armstrong Cork Co/1943) covers a flame-retardant composition comprising, among others, calcium phoshate, an amylaceous material and aldehyde resin condensates of dicyandiamide, urea, phenol or melamine.

News of the Trade



Celanese Corp of America's new plant in Pampa, Texas, makes the company a major supplier of acrylate esters.

Celanese Begins Operations at New Acrylate Ester Plant

Celanese Corporation of America last month announced it has started operation in Pampa, Texas of a new 15,000,000 - pound - a - year acrylate ester plant, thus marking another step in its extensive chemical expansion program. The company has begun tank car shipments of the chemical from Pampa.

The new facilities will add Celanese as a second major source of acrylate esters, a rapidly growing family of petrochemicals used in the textile industry in finishes and in backings for carpets and upholstery fabrics. Celanese also supplies the industry with vinyl acetate. The new acrylate ester plant supplements Celanese facilities in Pampa for production of acetic acid, acetic anhydride and vinyl acetate.

This production marks the first use of a new method for making acrylate esters discovered by B F Goodrich Company. The process at Pampa, developed by Celanese from basic Goodrich findings, utilizes acetic acid and formaldehyde, and is reported to be more economical than other processes. Celanese makes both acetic acid and formaldehyde, its Bishop, Tex plant, reputedly being the world's largest producer of the latter.

Immediate production at Pampa, according to Richard W KixMiller, Celanese vice president and general manager of the Chemical Division, will include methyl, ethyl and butyl acrylates, but Celanese is also proceeding to develop markets for the higher esters of acrylic acid.

Acrylic polymers derived from acrylate esters are clear, colorless, tough, stable, rubbery compounds. Production of these polymers in this country started about 25 years ago.

Sandoz Announces New Dyeing Procedure

Development of a procedure which reportedly enables dyeing of heat-textured filament nylon free from barré effects has been announced by Sandoz, Inc. It consists of a line of acid dyes especially for use on nylon, the Sandonyls; a new chemical leveling agent, Lyogen P; and a dyeing formula applicable on all standard machines.

The new procedure has been described and demonstrated for the benefit of the producers and dyers of Ban-Lon fabrics; and A T Hanes, Sandoz vice president, stated he believes that the demonstrations presented a very convincing picture. By eliminating barré effects, the Sandonyl process, Mr Hanes said, removes an important barrier to the use of better quality dyes on all heat-textured filament nylon knitgoods.

Use of the Sandonyl colors plus a tested group of bright shading Sulfonine dyes, with Lyogen P, will give 40-hour lightfastness on most shades, it is claimed. Exceptions, noted thus far, are a jade green, a bright violet, and a turquoise. The company's colorists are attempting to bring these three up to the level of the others.

A comparison of wash tests reportedly indicates that Ban-Lon, dyed by the new process, does not lose color or stain adjacent fibers. This is an important feature for knitwear which is going to be washed in home laundries.

Little or no increase in cost is involved, it is claimed.

As with other dyeing and finishing procedures, proper scouring before dyeing is an important point in producing the best work. Mill tests in the Philadelphia area are said to indicate that a scour with a combination of Rinfors S and Sandopan DTC cryptoanionic detergent will remove the sizes and knitting oils before dyeing.

Hooker Reelected SOCMA President

R Wolcott Hooker, senior vice president of Hooker Electrochemical Co, Niagara Falls, N Y, was reelected president of the Synthetic Organic Chemical Manufacturers Association at its 36th annual meeting, held December 4th at the Roosevelt Hotel, New York. The association represents manufacturers of 90% of the domestic production of commercially marketed synthetic organic chemicals.

Samuel G Baker, general manager, Organic Chemicals Department, E I du Pont de Nemours & Co, Inc, was elected first vice-president of the Association, and Robert E Hulse, executive vice president and general manager, chemical operation, U S Industrial Chemicals Co, was elected second vice-president.

C K Egeler, eastern manager, Pigment, Color and Chemical Division, Sherwin-Williams Company, was reelected treasurer of the association for 1958, while J R Frorer, vice president, Atlas Powder Co, and R Kithil, vice president, The Carwin Co, were elected new members of the Board of Governors.

Elvin H Killheffer and August Merz, past presidents of the Synthetic Organic Chemical Manufacturers Association, were reelected honorary members of the Board for one-year terms.

Metro-Atlantic, Inc Named Sole Distributor for Celersel in US

Metro-Atlantic, Inc, Centredale, RI, has been appointed the sole distributor for Celersel in the United States.

Celersel is a patented accelerator and dyebath assistant for use in the dyeing of wool and other animal fibers, which has undergone intensive tests in woolen and worsted dyehouses and reportedly has proved valuable as an aid in the production

of higher quality wool in a much shorter dyeing time.

It is claimed that, through the use of the Celersel process, it has been found possible to apply chrome dyestuffs in half the time necessary with conventional dyeing methods. The dyeing time is also said to be proportionately reduced when dyeing with acid dyestuffs. Dyeings obtained with the Celersel process reportedly have the same fastness properties as those produced by conventional methods.

The addition of Celersel to the dyebath is said to produce a noticeable and permanent swelling effect on the wool fiber, which permits more rapid diffusion of the dyestuff molecules to give faster dyeing times and better levelling. This swelling also is said to permit the metallization of the dye to take place more rapidly and without the need for long boiling. Celersel reportedly acts as a buffer which prevents the harshening effect and loss of the strength which is normally caused by the action of acids and chrome on the wool. Since Celersel tends to prevent fiber damage during dyeing and chroming, it is claimed that there is an increase in tensile strength over dyeings produced conventionally.

Other advantages claimed are better card roping, less card waste, higher spinning and weaving efficiency, improved hand, and better appearance of the finished product. It is also claimed that increased production, lower fuel costs, and the possible use of lower grade blends will result from the use of Celersel. It is said to be simple to use and to need no special equipment or extra processing.

Further information and technical assistance is available on request from Metro-Atlantic, Inc.

Fabulized Names Midwest Representative

Fabulized, Inc, Philadelphia, has appointed Prospect Chemical Company, Mt Prospect, Ill, as Midwest sales representatives for its new Fabulized finishing process.

Mona Expansion

Mona Industries, Inc, Paterson, N J and Greenville, S C, has begun construction of a 5000-square foot addition to its main plant at Paterson. This annex will be used for increased production of sequestering agents, fatty acid amine condensates and sulfosuccinic acid types of wetting agents and penetrants.

AHCO Creates New Department

The formation of a Techno-Commerical Department within the Company's organization has been announced by Arnold, Hoffman & Co, Inc, Providence, RI. This department was formed to plan the company's development and expansion program.

Initially, the Techno-Commercial Department will be under the direction of J R Myles, of Imperial Chemical Industries (New York), Ltd, who will be assisted by Charles A Robinson, previously with Arnold, Hoffman's Research Department. Additional staff will be assigned as the program develops.

Wich to Address NYPC

Emil Wich of General Dyestuff Co will deliver a lecture before the New York Pigment Club on "Dyes for Pigment Manufacture" at the Club's January 9th meeting at Fraunces' Tavern, Broad and Pearl St, New York. Reservations can be made by contacting Herbert Johnson, H Kohnstamm & Co, 537 Columbia St, Brooklyn 31, N Y.

Para Amino Phenol Available from Aceto

Aceto Chemical Co, Inc, Flushing, N Y, has announce the availability of Para Amino Phenol, which is used as a dyestuff intermediate and also in the manufacture of several pharmaceutical products. Further information can be had by contacting Aceto at 40-40 Lawrence St, Flushing 34, N Y.

Lyman Printing Appointed Licensee for Aston Finish

The Lyman Printing & Finishing Co, a division of M Lowenstein & Sons has been appointed a licensee for the new Aston antistatic finish developed and manufactured by the Onyx Oil & Chemical Company, Jersey City, N J

Lyman reportedly has discovered specific safety applications for Aston where static build-up in synthetic fabrics has presented a hazardous operating environment. "Heretofore limited in use in industry," said F O Robitschek, Onyx president, "all types of synthetics can now be Astonized for successful application to many jobs where static-free fabrics are necessary such as in surgical operating rooms and where industrial work involves explosive or flammable gasses or liquids."

A polymeric electrolyte, Aston reportedly provides the fibers with a polymer jacket that helps maintain an invisible moisture-absorptive film on the cloth. As a consequence the fabric breathes freely. Antistatic properties imparted to the fabric by the Aston treatment are said to be retained for its useful life.

According to an Onyx spokesman, when Aston is applied to fabrics used for wearing apparel, it dispels the static charge or build up inherent in all synthetics and blends. Astonized slips, sleepwear, dresses, suits, and other apparel will not cling, ride up, collect dust or lint, and never feel hot or clammy, it is claimed. Wash-durable, the finish is said to retain fabric strength, hand, and shape.

Armour Opens New Southeastern Sales Office

A new Southeastern sales office for the Chemical Division of Armour and Company has been opened in Atlanta, Ga, headed by L E Garrison.

Mr Garrison's sales territory will include Georgia, Florida, Mississippi, Alabama and western Tennessee. B H Tannel will continue to service North and South Carolina, Virginia and eastern Tennessee from the Charlotte, N C, office.

Mr Garrison started with the Armour Chemical Division in 1955 and was appointed sales representative for the Charlotte, N C, office in 1956.

Student Loan Fund Contributed to NC State

A $500 student loan fund has been contributed by John C Roberts, president of Textiles, Inc, Gastonia, N C, and recent president of the North Carolina Textile Manufacturers Association, to the School of Textiles at North Carolina State College.

The fund will be administered by the school's Textile Scholarship Committee, headed by G H Dunlap, who is also director of textile student affairs.

ASME-Textile Engineering Conference

"Cost Control through Engineering" will be the theme of the American Society of Mechanical Engineers' Textile Engineering Conference to be held for the first time at North Carolina State College, March 20-21, 1958.

For information write to E Lee Harrisberger, Department of Mechanical Engineering, North Carolina State College, Raleigh, NC.

NFI Elects Officers

At its Annual Meeting held November 11-12, the Narrow Fabrics Institute, Inc, reelected Russell J Neff of Phoenix Trimming as board chairman. Other reelected officers include: *President*——Carlton H Stauffer, York Narrow Fabrics Co; *Vice President*——John A DeAngelis, Murdock Webbing Co; *Treasurer*——E B Laughlin, Laughlin Textile Mills; and *Secretary*——Thomas R Beecher, Globe Woven Belting Co.

The meeting reviewed the status of various projects, including development of standard nomenclature, classification and definitions; standard job titles and descriptions; classification of defects covering military requirements for tapes and webbing.

Fletcher Works, the first member under its recently organized Associate Member classification, was represented at the luncheon session on both days. This new classification is open to distributors and suppliers, and to anyone having a legitimate interest in the narrow fabrics industry.

A review of textile dyeing processes was presented at the luncheon session on Tuesday by L S Thompson, manager of the Dyestuff Technical Department, General Dyestuff Co, a sales division of General Aniline and Film Corp.

LTI Offering Course in Pure Chemistry

Expanding its textile chemistry instruction, Lowell Technological Institute now offers a new course in pure chemistry up to and through the masters-degree level.

Martin J Lydon, president, who announced the new program offered for both graduate and undergraduate work in chemistry, stated that the freshman and sophomore years' curriculum are common in chemistry and textile chemistry.

Chemistry majors are provided with a basic knowledge of the four major branches of chemistry, inorganic, organic, analytical, and physical, and with advanced instruction in one or more of the same areas. This curriculum prepares the student for a position in the chemical industry or for further training at the graduate level, the latter advised for those planning a career in chemical research.

A sound foundation in basic chemistry and a knowledge of chemical applications in textiles and textile processes are combined in the textile chemistry course to provide a specialized training for chemists wishing to work in the textile industry or in related chemical industries producing auxiliary chemicals and fibers.

For further information, persons interested may contact George R Griffin, chairman, Chemistry Division, Lowell Technological Institute, Lowell, Mass.

RCI to Build 14th US Plant

The fourteenth U S plant of Reichhold Chemicals, Inc, will be built at Hampton, SC, where RCI recently purchased a large tract of land.

The first units to be built will include a large methanol terminal and facilities to produce 30,000,000 pounds of formaldehyde annually. Production will be underway about July 1, 1958.

RCI has scheduled a number of new plants for formaldehyde and pentaerythritol production as well as for manufacture of other products which involve methanol or formaldehyde in their production.

The decision to build in Hampton is in line with RCI's policy of erecting plants in the center of big consumption areas. A large consuming area for formaldehyde, methanol, urea-formaldehyde resins and other products made by RCI today is within several hundred miles of the new plant.

Increased production which the new plant will provide, added to that of the other new plants scheduled, plus greater phenol production facilities at Tuscaloosa, Ala, are designed to improve RCI's position as the leading producer of synthetic resins and chemicals to the industries it supplies.

Rodney Hunt Names Canadian Representative for Industrial Roll Div

Rodney Hunt Machine Co, Orange, Mass, has announced the appointment of W J Westaway Co, Ltd as sales representative for Rodney Hunt Industrial Roll Division in Canada.

The Westaway organization maintains sales offices at 7335 St Lawrence Blvd, Montreal 14, Quebec and also in Hamilton, Ontario. Three sales representatives and four assistants will serve Rodney Hunt customers in this territory.

Solitone Grants Dutch License

Aaron Permut, consulting chemist and director of Solitone Laboratories, Hasbrouck Heights, NJ, has announced the granting of a license to N V Nederlandsche Kleurstof Industrie, Amersfoort, Holland, for the manufacture of Solitone colors and auxiliaries for textile printing and dyeing. Solitone colors are oil-in-water (water-dilutable) pigmented resin emulsions, reportedly characterized by exceptional washfastness and abrasion resistance.

NKI is one of the oldest independent dyestuff manufacturers in Europe, and in recent years has become an important manufacturer of flexographic inks. It will sell and service Solitone products in the Benelux and Scandinavian countries, through its own sales organization and by appointed sales agents.

IPCC to Purchase S-W Dry Color Facilities in Canada

Imperial Paper and Color Corporation (Canada) Ltd has entered into an agreement to purchase the dry color manufacturing facilities of the Sherwin-Williams Company of Canada, Ltd. This agreement also includes the purchase of Sherwin-Williams' good will, customer lists and manufacturing procedures for dry colors, but does not include any other activities of the Sherwin-Williams Company of Canada, Limited. Sherwin-Williams will discontinue all dry color operations and Imperial will move the equipment it has purchased to the new St Johns, Quebec color plant.

Imperial Paper and Color Corporation (Canada) Ltd, a subsidiary of Imperial Paper and Color Corporation, of Glens Falls, NY, is now producing pigment colors in Canada at its St Johns plant. It also has available the facilities of the extensive research organization of the parent company.

Givaudan Corp to Move Offices in Spring

The Givaudan Corporation and its associate companies, Givaudan-Delawanna, Inc, Givaudan Flavors, Inc. and Sindar Corporation, are now preparing new, enlarged executive and sales offices for occupancy in Spring 1958. The company has concluded a long-term agreement, leasing the 7th and a portion of the 8th floors in the Warner Brothers Building 321 West 44th Street, New York 35, NY.

The actual relocation date has been tentatively scheduled for late April 1958.

TPCC Producing Benzoguanamine, Benzonitrile

Benzoguanamine, an organic chemical which is said to be adaptable for a wide variety of uses in textile finishing, is now available commercially for general industrial use.

Tennessee Products and Chemical Corp, has announced that this chemical is now in full production and is immediately available.

At the same time, the Company also announced that it is now producing benzonitrile in commercial quantities. Benzonitrile is a basic chemical used in the production of benzoguanamine and also is widely adaptable for a variety of process industries. A colorless liquid with an almond-like odor, it is immiscible with water and is said to be particularly useful as a solvent.

Benzoquanamine, a member of the triazine family, is similar in many respects to melamine. Produced in the form of free-flowing white crystals, benzoguanamine reportedly has a mild organic odor and is relatively nontoxic.

Resins containing benzoguanamine are said to be particularly serviceable in the manufacture of textile finishes. It also has potential uses as a chemical intermediate for applications such as dyeing and fire retardants. It reacts with formaldehyde and alcohol to form triazine resin and can be processed with the same equipment and techniques as used for melamine, it is claimed.

Samples and technical data may be obtained by writing to general offices of Tennessee Products and Chemical Corp, 326 Union Street, Nashville, Tenn.

Jomac-North, Inc Formed

Jomac Inc, Philadelphia, Pa, and James North & Sons Ltd, London, England, have established two new companies to manufacture and sell each others products in the United States and in principal industrial areas throughout the world.

Jomac is a manufacturer of terry cloth work golves. James North & Sons is the principal in a group of companies which manufactures work gloves and protective clothing.

In the United States, the two companies have formed Jomac-North, Inc to manufacture the complete North PVC (polyvinyl chloride) line of coated gloves, protective clothing and aprons. Equipment for manufacturing both the coated fabric and the finished products is being installed in Jomac's plants in Philadelphia and Warsaw, Ind. Approximately 20,000 square feet of space will be used initially for this purpose. The PVC products will be sold by Jomac Inc.

In England, the two companies have formed North-Jomac Ltd to manufacture and sell Jomac work gloves, sleeves, hand guards and dampener roller covers. Equipment for making both the cloth and the finished products is being installed in North's two factories in Hyde, Cheshire, England.

CHEMICAL RESISTANT CLOTHING———The three-quarters-length coat and bib-style apron illustrated are part of a complete line of PVC protective clothing and aprons manufactured by Jomac-North, Inc and sold by Jomac Inc. They protect against corrosive chemicals and a wide variety of other industrial materials. Light in weight and flexible, they reportedly are comfortable to wear yet offer full protection.

Jomac-North PVC-coated work gloves

Jomac-North, Inc is the twelfth company outside of England to become a member of the North group.

Present plans call for all of the companies in the North group to sell Jomac products made by North-Jomac Ltd. Eventually, most of them will also manufacture the line.

The organization of the two new firms by Jomac Inc and James North & Sons Ltd is on an equal partnership basis.

Colehower

H Howard Colehower, Jr, president of Jomac Inc and James North Canada Co Ltd, has been named president of Jomac-North, Inc. Other officials include Donald T Trimble, vice president in charge of manufacturing; Howard E Eldridge, vice president in charge of sales; W Thomas Tither, secretary; and Charles H Sawyer, sales coordinator.

• NAMES IN THE NEWS •

Ames

Waddey

Dolan

De Lollis

Announcement has been made by Colton Chemical Co, A Division of Air Reduction Company, Inc, Cleveland 14, Ohio, of the appointment of **James K Ames** as Central District Sales Manager.

Mr Ames has been Chicago District Manager of Colton Chemical Co since 1954.

Lewis R Waddey has been named Branch Manager of the Chattanooga, Tenn, sales office of General Dyestuff Co, a sales division of General Aniline & Film Corp. Mr Waddey succeeds **H Alison Webb,** who was recently appointed assistant sales manager—General Dyestuff Company.

Mr Waddey has been a sales executive at the Charlotte, NC, branch of the Company for the past 25 years.

Robert P Rhodes has been appointed Middle Atlantic Divisional Sales Manager for Fabulized, Inc, Philadelphia manufacturers of Fabulized, a new finishing process. Mr Rhodes will operate from company headquarters at 518 South Delaware Avenue, Philadelphia 47, Pa.

Earl Fuller, formerly of Jantzen Inc, Portland, Ore for 26 years, has been appointed head of production and development of Cortina Knits, a division of Rose Marie Reid, Los Angeles, Calif.

Nopco Chemical Company's Industrial Division has announced the appointment of **William F Dolan, Jr** as technical sales representative in North Carolina and the eastern part of Tennessee.

Mr Dolan has been with Nopco's Textile Chemicals Division since 1955.

Robert C De Lollis has been appointed sales representative for the Mid-Atlantic sales territory of Emery Industries, Inc. He will handle Emery's complete line of fatty acids in central and northeastern Pennsylvania, northern New Jersey, western Maryland and central New York state. He succeeds **P N Leech,** who recently was transferred to Emery's Chicago office.

P J Wood, technical director of Royce Chemical Co and Olney Medal winner for 1957, has been further honored by his selection as chairman elect of the Passaic Valley Subsection, American Chemical Society, for 1958. **Mr Wood** has served the Subsection previously as secretary.

Fourteen European chemists recently visited Lowell Technological Institute to learn the mission of the Institute, view its education methods and processing techniques, and participate in informal conferences with faculty leaders at luncheon. They were welcomed by **Charles F Edlund,** dean.

Representing Ciba, Ltd, Basle, Switzerland, were **Richard Casty,** head of the wool department, **H H Zweifel,** deputy manager, and **Fritz Schuetz,** head of the dyehouse and assistant manager. Also from Ciba were **Prin Claudio Boggero,** assistant manager of the color department in Milan, Italy, and **Fernand Schlaeppi,** chief technician for Ciba Co, Inc, Rumford, R I. Clayton Dyestuffs Co, Ltd of Manchester, England was represented by **J A Potter,** deputy chief colorist, **T A Forster,** branch manager for Yorkshire, and **W G B Grant,** branch manager for Scotland.

Also attending were **Jacques Hopf** and **Claude Hopf** of J Hopf & Cie, Basle; **Hans Reinhard,** partner and technical manager, the Berne firm, and **Gustav Wiederkehr,** partner, St Gallen firm, of the carpet manufacturing plant, Teppichfabrik Buchs Wiederkehr & Co, Switzerland; **Hermann Schaer,** owner and technical manager of the carpet manufacturing plant, Tuchfabrik A G Lotzweil, Berne; and **Joseph Kneubuehler,** manager of A Kuonis Tourist Office Ltd, Basle, tour conductor.

Talks were given by **Jacob K Frederick, Jr,** chairman of the LTI division of textiles; **Chapin A Harris,** head, department of fibers and yarns; **Vittoria Rosatto,** head, department of fabrics; **John J McDonald,** head, finishing department; **Russell L Brown,** head, wool section; **John H Skinkle** and **Joseph B Quig** of the department of textile chemistry.

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• Emkafix	• Emkalube	• Emkasize	• Rexobase	• Rexole	• Rexosolve	• Rexowet
• Emkafol	• Emkanet	• Emkasol	• Rexobond	• Rexolene		
• Emkagen	• Emkanol	• Emkatard	• Rexoclean	• Rexoloid		
• Emkalane	• Emkapel	• Emkatex	• Rexodull	• Rexolube		
• Emkalar	• Emkapene	• Emkatol M	• Rexofos	• Rexopene		

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